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                 Ramseier, Thomas M.

<120>   Directed Genetic Engineering of Xanthomonas campestris

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aggagcgggc gtggaatgca tgtgcccgta tcggcctcga gcgcggcgac ttgatcacgc 3240

gcgactggcg ccgttcagtt ggccgcgcgt gcgagtggtg cagcgcggca atccgcacgc 3300

tgcattcgac actccgcgca gcactggcgg ccgaatcact gcgctgcacc acggcagggc 3360

gcagacgggt tcgggtgcgc tgtgcctaca gggccgaggg tttgctcgcc gtttgcaacg 3420

agcgcgtggt gcatggacac gcacgagata acgttaccag cacgctggat gcggatctgc 3480

gcgctctgtc ctgatctgta cctgttgtcg attctgtgac ccgcgctgcg atcgcctgcg 3540

tcgcgggttg gcaaggtctt ggcgcacgcc tgatgcgcgc tgtccgcgga cgccggtctg 3600

cggcgtccac cttgtctgga gccgagc                                    3627
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9

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<210>      5
<211>      2730
<212>      DNA
<213>      Xanthomonas campestris

<220>
<221>      unsure
<222>      (1)..(2730)
<223>      unsure at all n locations

<400>      5

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gcacttgatc ggctggcagc ctagataggg cgttcgacga ctgcgctgtg tacgcaacgt     180

cggttgtgct tcagcgcaaa gacaaagact gacgcgctgt catccatgag ccgcggcgaa     240

cgatcaccca tgcagaggca gccgcgcaac gtctttgcga aagccggcca aaaccgcagc     300

aggcacacca ggcgcttagc gcccgggttc gcgctgcggt cccgggcttg ggcgcttggt     360

gagcttgcgc tgcagcgagc ggcggtgcat gcccagcagg cgcgcggcgg cggacacgtt     420

gccgccggtt tcgtgcagcg cctgctggat gtgctcccac tgcaggcggc tgagcggggt     480

catcatttcc tgcgcggttt cttcttcgtc cggatcgggc aggtcgtcgt cctcttcgcc     540

cagcgcacgc atgatggtgg ggatgttggc tggcttgggc aggtagtcgt cggcgccgag     600

cttgatcgcc tccaccgcgg tggcgatgct cgcgtacccg gtgaccagca ggatgcgcat     660

gtccgggcgg atttcgcgca gcggctggat caggttcaat cccgagtcgt ggcccagctt     720

cagatcgatc aaggcgaagt ccggcagcgc gctgcgtgcg gtggacaagg cgctggccgc     780

atcggtggcg gtgagcgttt ccacgccgcg gcgggcgagg ctgcgttgca aggtacgcag     840

atacagggtg tcgtcgtcga ccagcaggcc ggtgcggatg ggagtgctca tgcaagggcc     900

tcgtgttcgg agagcggcag gcggaaaccg acgcgggcgc cgctgccttc ggcgggaagc     960

atccacagtt caccctgcag ccgctcgacg gtggcatgcg acagggccag gcccacgccc    1020

atgccgtcgg gcttgccgct gttgaacaag gtgcccggca acatcgcctg cgaggtgtcg    1080

aagcccagcc cgtagtcgcg cacttcgccg accagttggt cgtcttccac gcgcagggtg    1140

aggtcgatca gcggccggcc ggcgcgttcg ccggcatcgg cggcattgtt gagcagcacc    1200

atcagcaggt ggctcacgcc gggctgcagc atcagccgca gcggcgcgtc ttcattgcgg    1260

cgcagctcga tggtcgggcg caccaggcgc cactgttcca gcacatcgcg caccgccacc    1320
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10

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tcgcggctga gatggccgtt gtcggccggt gctgccagcg ccagcacgcg ctcgtggcat 1380

tgcaccagca gctcgcgcag ggtttccagg tcttcgcgca actcgacctg atcgcactgg 1440

tcggcgatgt cgtcggccag cagggtcatc gtcgccagcg gggtgttgag ctcatgcgcc 1500

accgaggcgg catgcgtggc cagcgccacg atgccttcgt tgcgtgcaaa gcgctcgcgc 1560

agtgtggaga tctcgcgttc gcgctcgcgc agcgacaacg ccagccgggt ggcgaacacc 1620

agcaccacca cggtggaaag caggaagttg gccgccatgc cccacatgtg cagggtcaac 1680

gggtcgaagc cgccgtacgg cagtggcaag ccgaatgcgg cgctgatgac gtagccggcc 1740

acgcaggccg ccgccaccgc catcgcccag ctcagcggca gggcgagcgc ggccagcgcg 1800

atcagcacca ggaacagcga accgaacggg ttggcgatgc cgccgctcca gcccaccatc 1860

caggtcagca ccgtcacatc gaccaggatg tggccgaact cggtggccgg gctgaccgnn 1920

ccnnggtgcg ccacccgcag ctgcgcatcc cgggcgcaca ccggcggcgc ggccaccccg 1980

gcccaaagcg gatcctgccg aagggagagg ccaattacac ccgtggcgag caggatgggt 2040

ggccgactgt ccgagcgagg cctgttcaac gcatgcctgc cagggtacgg caagaactga 2100

agccggctta aagtatttac tgtttggtaa taacttatgc gcttttgtcc aggtgttgag 2160

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ggagcccccg aatgtttagc caattcccgt gttttttaac accttttgtt attgggcccc 2280

tgggaaaccc cgggctcctg actccccagt ttcgtccgac ctcttgtcag gtcccccgag 2340

aattgttttc tgttaaattc cccgggttta gggtccggat atttcaaagg tccgcccccc 2400

ccgaccggga atctctaagg tggcccttgt ttgaaccgtc cccttgttta gtaaaccagg 2460

tccgtaataa gaatttcgtt aggctaaatt tttttttgga tcggtagcca cagttgtgaa 2520

aggatttttt ttcgggtttt atttggctaa acttcctgtg gctttggggg gcccttttat 2580

accagcggtg gccttggtca cctttataac tatccccaaa tgttttgagt ggtgcttctc 2640

ttattggtca actcaggggt ccctattttt accctactcc aaatctatat ttcccccgct 2700

cggtggggta ttggtcttat tcctgggccg                                  2730
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gcaaggcatc gggaatcacc aggacgtcat cggagcgcag cgcgtgcgcg cagaaggcat    60

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cgtccaccag cgagaccagg gcgatctcgg tccccagcat gcgtgcggcc atggcggcga   180

tggtgtcgaa caccgggtcg ggcggcgagt ccagcaggca aagaccgtgc aggaccgcca   240

gccgtgccgc ttcatcgagc gcagacggga ggggggaggc gacaggagcg ggcgtggaat   300

gcatgtgccc gtatcggcct cgagcgcggc gacttgatca cgcgcgactg cgccgttca    360

gttggccgcg cgtgcgagtg gtgcagcgcg gcaatccgca cgctgcattc gacactccgc   420

gcagcactgg cggccgaatc actgcgctgc accacggcag ggcgcagacg ggttcgggtg   480

cgctgtgcct acagggccga gggtttgctc gccgtttgca cgagcgcgt ggtgcatgga    540

cacgcacgag ataacgttac cagcacgctg gatgcggatc tgcgcgctct gtcctgatct   600

gtacctgttg tcgattctgt gacccgcgct gcgatcgcct gcgtcgcggg ttggcaaggt   660

cttggcgcac gcctgatgcg cgctgtccgc ggacgccggt ctgcggcgtc caccttgtct   720

ggagccgagc a                                                         731


<210>      7
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<212>      DNA
<213>      Xanthomonas campestris

<400>      7

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acttgatcgg ctggcagcct agatagggcg ttcgacgact gcgctgtgta cgcaacgtcg   180

gttgtgcttc agcgcaaaga caaagactga cgcgctgtca tccatgagcc gcggcgaacg   240

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gcacaccagg cgcttagcgc ccgggttcgc gctgcggtcc cgggcttggg cgcttggtga   360

gcttgcgctg cagcgagcgg cggtgcatgc ccagcaggcg cgcggcggcg gacacgttgc   420

cgccggtttc gtgcagcgcc tgctggatgt gctcccactg caggcggctg agcggggtca   480

tcatttcctg cgcggtttct tcttcgtccg gatcgggcag gtcgtcgtcc tcttcgccca   540

gcgcacgcat gatggtgggg atgttggctg gcttgggcag gtagtcgtcg cgccgagct    600

tgatcgcctc caccgcggtg gcgatgctcg cgtacccggt gaccagcagg atgcgcatgt   660

ccgggcggat ttcgcgcagc ggctggatca ggttcaatcc cgagtcgtgg cccagcttca   720
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12

gatcgatcaa ggcgaagtcc ggcagc   746

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<213>   Xanthomonas campestris

<400>   8

aaaactgcag ccagcaaggc atcgggaatc   30

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<212>   DNA
<213>   Xanthomonas campestris

<400>   9

acgagtcgac tcggctccag acaaggtgga   30

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<400>   10

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<400>   12

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13

<210> 13
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<400> 13

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<400> 14

cggtggggcc atcgcggtag gta   23

<210> 15
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<400> 15

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<210> 16
<211> 329
<212> PRT
<213> Streptomyces lividans

<400> 16

Met Arg Asn Ala Arg Ser Thr Leu Ile Thr Thr Ala Gly Met Ala Phe
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Ala Val Leu Gly Leu Leu Phe Ala Leu Ala Gly Pro Ser Ala Gly Arg
            20   25   30

Ala Glu Ala Ala Ala Gly Gly Ile His Val Ser Asn Gly Arg Val Val
        35   40   45

Glu Gly Asn Gly Ser Ala Phe Val Met Arg Gly Val Asn His Ala Tyr
    50   55   60

Thr Trp Tyr Pro Asp Arg Thr Gly Ser Ile Ala Asp Ile Ala Ala Lys
 65   70   75   80

Gly Ala Asn Thr Val Arg Val Val Leu Ser Ser Gly Gly Arg Trp Thr
                85   90   95

Lys Thr Ser Ala Ser Glu Val Ser Ala Leu Ile Gly Gln Cys Lys Ala
            100   105   110

Asn Lys Val Ile Cys Val Leu Glu Val His Asp Thr Thr Gly Tyr Gly
        115   120   125

14

```
Lys Asp Gly Ala Thr Ser Leu Asp Gln Ala Gly Asp Tyr Trp Val Gly
    130                 135                 140

Val Lys Ser Ala Ala Trp Arg Ala Gln Glu Asp Tyr Val Val Val Asn
145                 150                 155                 160

Ile Gly Asn Glu Pro Phe Gly Asn Thr Asn Tyr Ala Ala Trp Thr Asp
                165                 170                 175

Ala Thr Lys Ser Ala Ile Gly Lys Leu Arg Gly Ala Gly Leu Gly His
            180                 185                 190

Ala Leu Met Val Asp Ala Pro Asn Trp Gly Gln Asp Trp Ser Gly Thr
        195                 200                 205

Met Arg Ser Asn Ala Ala Ser Val Phe Ala Ser Asp Pro Asp Arg Asn
    210                 215                 220

Thr Val Phe Ser Ile His Met Tyr Gly Val Tyr Asp Thr Ala Ala Glu
225                 230                 235                 240

Val Arg Asp Tyr Leu Asn Ala Phe Val Gly Asn Gly Leu Pro Ile Val
            245                 250                 255

Val Gly Glu Phe Gly Asp Gln His Ser Asp Gly Asn Pro Asp Glu Asp
            260                 265                 270

Ala Ile Met Ala Thr Ala Gln Ser Leu Gly Val Gly Tyr Leu Gly Trp
        275                 280                 285

Ser Trp Ser Gly Asn Gly Gly Gly Val Glu Tyr Leu Asp Met Val Asn
    290                 295                 300

Gly Phe Asp Pro Asn Ser Leu Thr Ser Trp Gly Asn Arg Ile Leu Tyr
305                 310                 315                 320

Gly Ser Asn Gly Ile Ala Ala Thr Ser
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<211>       325
<212>       PRT
<213>       Caldocellum saccharolyticum

<400>       17
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Thr Val Val Phe Leu Leu Asn Ile Leu Phe Ile Ala Asn Val Thr Ile
            20                  25                  30

Leu Pro Lys Val Gly Ala Ala Thr Ser Asn Asp Gly Val Val Lys Ile
        35                  40                  45
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Asp Thr Ser Thr Leu Ile Gly Thr Asn His Ala His Cys Trp Tyr Arg
    50                  55                  60

Asp Arg Leu Asp Thr Ala Leu Arg Gly Ile Arg Ser Trp Gly Met Asn
65              70                  75                  80

Ser Val Arg Val Val Leu Ser Asn Gly Tyr Arg Trp Thr Lys Ile Pro
            85                  90                  95

Ala Ser Glu Val Ala Asn Ile Ile Ser Leu Ser Arg Ser Leu Gly Phe
            100                 105                 110

Lys Ala Ile Ile Leu Glu Val His Asp Thr Thr Gly Tyr Gly Glu Asp
        115                 120                 125

Gly Ala Ala Cys Ser Leu Ala Gln Ala Val Glu Tyr Trp Lys Glu Ile
    130                 135                 140

Lys Ser Val Leu Asp Gly Asn Glu Asp Phe Val Ile Ile Asn Ile Gly
145                 150                 155                 160

Asn Glu Pro Tyr Gly Asn Asn Asn Tyr Gln Asn Trp Val Asn Asp Thr
            165                 170                 175

Lys Asn Ala Ile Lys Ala Leu Arg Asp Ala Gly Phe Lys His Thr Ile
        180                 185                 190

Met Val Asp Ala Pro Asn Trp Gly Gln Asp Trp Ser Asn Thr Met Arg
    195                 200                 205

Asp Asn Ala Gln Ser Ile Met Glu Ala Asp Pro Leu Arg Asn Leu Val
    210                 215                 220

Phe Ser Ile His Met Tyr Gly Val Tyr Asn Thr Ala Ser Lys Val Glu
225                 230                 235                 240

Glu Tyr Ile Lys Ser Phe Val Asp Lys Gly Leu Pro Leu Val Ile Gly
            245                 250                 255

Glu Phe Gly His Gln His Thr Asp Gly Asp Pro Asp Glu Glu Ala Ile
            260                 265                 270

Val Arg Tyr Ala Lys Gln Tyr Lys Ile Gly Leu Phe Ser Trp Ser Trp
        275                 280                 285

Cys Gly Asn Ser Ser Tyr Val Gly Tyr Leu Asp Met Val Asn Asn Trp
    290                 295                 300

Asp Pro Asn Asn Pro Thr Pro Trp Gly Gln Trp Tyr Lys Thr Asn Ala
305                 310                 315                 320

Ile Gly Thr Ser Ser
                325
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<210>   18
<211>   3461

16

<212>   DNA
<213>   Xanthomonas campestris

<220>
<221>   CDS
<222>   (1001)..(2461)

<400>   18

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cgcaagaggg ggctgaccag cacgctgcga atgacgctgc catcgttgaa gcggtaatcg   120

atctcgcctt cgcgcttgac gcggctggtc tcgatgatct ggcggacctg cgccaccagt   180

tcctgctgcc gcagctgcgc gttgcgctcc tcggccaatg cgcggtcgcg ctcggcgcgc   240

tcggcttgca ggcgggcggc atccaccttg tccgggtctg ctgcggccgc cggtgcaccc   300

ttggcatggc gctgcttgtt ctgctcgcgc gccaccttgt ccacctgggc tttcttgacc   360

aggcctgcct tgagcagttg ttcttgaaga ggattgcgca tgcgagaaaa ccaacggtaa   420

cgtgcacaca gtttaacgcg accggcgtgg tggccgccga gcgcacaagg tgtcgctgcc   480

ccaggaggcc tgaaccaggc tgttcaggct tagcgccgct atcaaaacgc ctgcagccgc   540

cagccgggcg cggccggtgc taggaatcgg catgtacccc catacactcc gggtgctccg   600

cgccggccgc acccacctga caacttactc gctacgtttc ggtagccgct cttcataccg   660

ctgagccgtt gtgcacgcgc tgctgcactg gctgccgtc gttgcctgta gcgcgcaggt   720

tgcgccccga gcccggcctg ctggacgtca cggcatccat accggcaacc accgccgcca   780

ttcatcagca ccgcgcgcaa tgcgtcggcg cgagtgcgac cgtgcacgcc ctcggcatcg   840

aaccggccgc acgtttcgcg gctgttgtgc agtgaatacg tatgcacagg gtcaatgctg   900

cgccgcgatg cgcgcttagc atcaccgcgc gccgcacgcc gtggggcgcg ctttccggaa   960

caggg_gccgg aggg_cattgc tgcatgcatc gctgtgcggg atg cgt gcg tcc act   1015
                                                    Met Arg Ala Ser Thr
                                                    1   5

gat cag gag aca cac ccg atg cac gcc acc tct cgc ccc tgt cca cgc   1063
Asp Gln Glu Thr His Pro Met His Ala Thr Ser Arg Pro Cys Pro Arg
            10   15   20

acg ttc tgg caa cgc gct cac cag ttg ctg ttg atc gcg ctg acc ttg   1111
Thr Phe Trp Gln Arg Ala His Gln Leu Leu Leu Ile Ala Leu Thr Leu
        25   30   35

ttg ctg acc acc gcc agc gca cag gcc gac gtc atc ctg cat gcg ttc   1159
Leu Leu Thr Thr Ala Ser Ala Gln Ala Asp Val Ile Leu His Ala Phe
        40   45   50

17

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aac tgg ccc tac gcc acg gtg gaa gcg cgc gcc aag cag atc gcc gat        1207
Asn Trp Pro Tyr Ala Thr Val Glu Ala Arg Ala Lys Gln Ile Ala Asp
    55                  60                  65

gcc ggg tat cgc aag gta ctg gtc gca ccg gcg tat cgc tcc gaa ggc        1255
Ala Gly Tyr Arg Lys Val Leu Val Ala Pro Ala Tyr Arg Ser Glu Gly
70                  75                  80                  85

agt gcc tgg tgg gcg cgc tac cag ccg cag gat atc cgc ctg atc gac        1303
Ser Ala Trp Trp Ala Arg Tyr Gln Pro Gln Asp Ile Arg Leu Ile Asp
                90                  95                  100

aat cca ctc ggc gac acc acc gcg ttc gcg cgc atg gtg cag gca ctg        1351
Asn Pro Leu Gly Asp Thr Thr Ala Phe Ala Arg Met Val Gln Ala Leu
            105                 110                 115

gcc aat aac ggc gtg gaa acc tat gcc gac gtg gtg ttc aac cac atg        1399
Ala Asn Asn Gly Val Glu Thr Tyr Ala Asp Val Val Phe Asn His Met
            120                 125                 130

gcc aac gaa gca gca acg cgc tcg gac ctc aat tac ccc ggc agc gcg        1447
Ala Asn Glu Ala Ala Thr Arg Ser Asp Leu Asn Tyr Pro Gly Ser Ala
            135                 140                 145

gtg ctg gcg cag tac gcg gcc aat cct ggg cgc tac gat gca ctg cgc        1495
Val Leu Ala Gln Tyr Ala Ala Asn Pro Gly Arg Tyr Asp Ala Leu Arg
150                 155                 160                 165

ctg ttc ggc acc gtg cag tcc aac ttt ttg agc ggc agt gat ttc ggg        1543
Leu Phe Gly Thr Val Gln Ser Asn Phe Leu Ser Gly Ser Asp Phe Gly
                170                 175                 180

ccg gcg caa tgc atc agc aac tac aac gat gcc ttc cag gtg cgc aat        1591
Pro Ala Gln Cys Ile Ser Asn Tyr Asn Asp Ala Phe Gln Val Arg Asn
            185                 190                 195

tac cgc atc tgc ggc ggc ggc agc gat ccg ggc ctg ccg gat ctg ctc        1639
Tyr Arg Ile Cys Gly Gly Gly Ser Asp Pro Gly Leu Pro Asp Leu Leu
            200                 205                 210

ggc aac gat tgg gtg gtg cag cag cag cgc gcc tac ctg cag gcg ctc        1687
Gly Asn Asp Trp Val Val Gln Gln Gln Arg Ala Tyr Leu Gln Ala Leu
            215                 220                 225

aag ggc ctg ggc gtc acc ggc ttc cgc gtg gac gcg gcc aag cac atg        1735
Lys Gly Leu Gly Val Thr Gly Phe Arg Val Asp Ala Ala Lys His Met
230                 235                 240                 245

acc ttc gac cat ctc aac cgc gtg ttc gat gcc ggc atc cgc tcc ggt        1783
Thr Phe Asp His Leu Asn Arg Val Phe Asp Ala Gly Ile Arg Ser Gly
                250                 255                 260

gtg tac gtg ttt ggt gaa gtg atc acc ggc ggt ggc agc ggc aat ggc        1831
Val Tyr Val Phe Gly Glu Val Ile Thr Gly Gly Gly Ser Gly Asn Gly
            265                 270                 275

gac tac gac cag ttc ctg gcg ccg tat ctg caa tcc acc ccg cat gcc        1879
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18

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Asp Tyr Asp Gln Phe Leu Ala Pro Tyr Leu Gln Ser Thr Pro His Ala
        280                 285             290

gcc tac gat ttc ccg ctg ttc aac gcg gta cgc acg gcc ttc ggt gtg    1927
Ala Tyr Asp Phe Pro Leu Phe Asn Ala Val Arg Thr Ala Phe Gly Val
        295                 300             305

ggt gcg agc atg caa cag ttg gtg gac ccg gcg tcc gcc ggg cag gcc    1975
Gly Ala Ser Met Gln Gln Leu Val Asp Pro Ala Ser Ala Gly Gln Ala
310                 315             320             325

ttg ccg ggc aac cgt gca gtc acc ttt gcc gtg acg cat gac atc ccc    2023
Leu Pro Gly Asn Arg Ala Val Thr Phe Ala Val Thr His Asp Ile Pro
                330             335             340

aat aac gcg ggc ttc cgc tac gcg att ctc gac ccg gtc gat gaa acg    2071
Asn Asn Ala Gly Phe Arg Tyr Ala Ile Leu Asp Pro Val Asp Glu Thr
                345             350             355

ctg gcc tat gcg tac ttg ctg ggc cgc aac ggc ggc gtg ccg atg gtc    2119
Leu Ala Tyr Ala Tyr Leu Leu Gly Arg Asn Gly Gly Val Pro Met Val
        360                 365             370

tac acc gac aac aac gaa agc ggc gac aac cgc tgg gtc aat gcc tat    2167
Tyr Thr Asp Asn Asn Glu Ser Gly Asp Asn Arg Trp Val Asn Ala Tyr
        375                 380             385

ctg cgc gat gat ctg cgc cgc atg att ggc ttc cac aac ggc gtg cag    2215
Leu Arg Asp Asp Leu Arg Arg Met Ile Gly Phe His Asn Gly Val Gln
390                 395             400             405

ggc agc gac atg cag gtg ctg tca tcc agt gcc tgc cac atc ctg ttc    2263
Gly Ser Asp Met Gln Val Leu Ser Ser Ser Ala Cys His Ile Leu Phe
                410             415             420

cgc cgc ggc agc ctc ggc atc gtg ggc atc aac aag tgc ggc aac ccg    2311
Arg Arg Gly Ser Leu Gly Ile Val Gly Ile Asn Lys Cys Gly Asn Pro
                425             430             435

gtc aac acc acc gtc gcc atg aac ggc agc gtg ttg ttc tgg aat gcg    2359
Val Asn Thr Thr Val Ala Met Asn Gly Ser Val Leu Phe Trp Asn Ala
                440             445             450

gat tac gtc gat gca ctg ggt tcc ggc acc gtg gtg cgc atc tcc agt    2407
Asp Tyr Val Asp Ala Leu Gly Ser Gly Thr Val Val Arg Ile Ser Ser
        455                 460             465

ggc tcg tac acc ttc acc ctg ccg gcg cgg cag gcg cgt atg tgg cga    2455
Gly Ser Tyr Thr Phe Thr Leu Pro Ala Arg Gln Ala Arg Met Trp Arg
470                 475             480             485

cgt tga ttttgcagac gcgctgcagc acggtctgtt ttccgtaggt gacatccagg    2511
Arg

caaccaggga acaccagcag atcccgctga gtagcaacac cgacgccttc atgggtgcag    2571

cccgcatgaa ggcgtcgatg cgttaggcaa ccgaaaaaat ctacaacgac gcatcttttt    2631
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19

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cattgctggc ggcatttcag gaccacgcga tgacgcgcac ggttaccagc aggcgccctc   2691

gcgcgcatgc caaccaaaga tgaactgtcc gcgcaccgca acccatcaat gcaacccgtt   2751

cgcacggcgc gcgtacctac gagcggtcgc tgcaattgct tccttctgct gcgcggcgac   2811

catcgtggcg agcgccatgc gagcactaca cgcatgacat cgccctcccc catcgatggt   2871

gcacgccgga gcatgcgatg cctctctact ttgtccgcca tggggaatcg ctcgccaacg   2931

aacagaacta cttcgctggt tcccagaatt cgccgctgac ccggctcggc cggcatcagg   2991

cgcagcaggc cgcgctacgt gcagcaacgc gcactgcact tcgaccaggt gcatgtctcc   3051

acgctggagc gcgcgcaggc aacggcagcc atcatcctgc atgacgttgc gcccatgccc   3111

gaggtcgttt ccagcgcggc actggtggaa cgcaacttcg gcatcttcgc cggcaagaac   3171

aagaccttga tcaagaagtc ggtcggccat gcggtgtttg aacgctactt ccatgatgcc   3231

gatggcgcgc caccggacgg cgaacactgg atggatatgt acgcccgctg caagacctac   3291

tacgagaccg tgctggcgcc gctggatcag caagccaagc acgtgctggt cgtcgcgcac   3351

aaatacatcg tggaagtctt agcgctgatc gcatccgggc tgccgccagc ggagtacatc   3411

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gtgcggcggt gttgttcctg tcgatcagct ggacggtgct gcgcacgcgc gaatacagcc    180

cggccgagct ggcggcgttt gaaccggcgc cggcaccggc tgccgcgcaa ctggccgcca    240

ccgatcaacc cagcctgcag gccagcgtgc tgtggtgtct gggcgggttg ctgctggccg    300

ctgccatcgc ctggcagcac ggcgatcgca tgttgtacgt gctggcgggc ctgtgcatcg    360

cctatggcgt gctgctggcg ttggcgcgcg tgctgccgcg tggcggcatg ctggtcgcaa    420

tcatgcacga tctgcgccac atgccgcaga cgatgcggcg cctggcctgg gtgcagttct    480
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20

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tttcgtggtt tgcgctgttt gcgatgtgga tctacaccac cgcggcagtg acgcaggtgc    540

atttcggcgc acgcgatacc gtctcggccg cctacaacga cggggcgaac tgggtgggtg    600

tgttgttcgg cgcctacaac ggctttgccg cgctcgccgc caccgtcatc ccgctgatgg    660

tgcgtgcgat cgggctgcgc tggagccacc tgtgcaacct gtggctgggt gcggcggggt    720

tgttgtcgat gctgttcatc cgcgacccgt actggctgct gctgtcgatg ctgggcgtcg    780

gttttgcctg ggcctcgatc ctgtccttgc cctatgcact gctgtccgac agcgtgcccg    840

ccgccaagat gggcgtgtat atgggcatct tcaatttctt tatcgtgatt ccgcaattgg    900

ttgccgccag cgccctgggc ttcgtgctcc gcgtgtggct gggcgggcaa ccgatctacg    960

cgctggcgat cggcggcttg agcctgatcg tggccggtgt gtg cgt ggt gcg ggt    1015
                                              Val Arg Gly Ala Gly
                                               1               5

ccc aag cgc cca ggg agg gca atg atg cgc agc gtc ttg atg gca gcc    1063
Pro Lys Arg Pro Gly Arg Ala Met Met Arg Ser Val Leu Met Ala Ala
                10               15               20

atg ctg ctt tat tcg gga gca gcc tgc gct gcg cct gca ccc ggt gat    1111
Met Leu Leu Tyr Ser Gly Ala Ala Cys Ala Ala Pro Ala Pro Gly Asp
            25               30               35

tac tac ggc acc ctg gaa ccg ttc gcc gcc gat gcg gtg tat ttc gtg    1159
Tyr Tyr Gly Thr Leu Glu Pro Phe Ala Ala Asp Ala Val Tyr Phe Val
            40               45               50

gtc acc gat cgc ttc gtc aac ggc gac acg ggc aac gat cac cgc gac    1207
Val Thr Asp Arg Phe Val Asn Gly Asp Thr Gly Asn Asp His Arg Asp
        55               60               65

cag ggc ggc gca cat cgc agc ttc gat gtg ccc aca ccg tgc gac ggt    1255
Gln Gly Gly Ala His Arg Ser Phe Asp Val Pro Thr Pro Cys Asp Gly
70               75               80               85

ggc gtg ggc gac aac atc ggt tac ctc ggc ggc gac ttc aag ggc atc    1303
Gly Val Gly Asp Asn Ile Gly Tyr Leu Gly Gly Asp Phe Lys Gly Ile
                90               95              100

gtc gat cat gcc gac tac att cgc ggc ctc ggc ttt ggc gcg gtg tgg    1351
Val Asp His Ala Asp Tyr Ile Arg Gly Leu Gly Phe Gly Ala Val Trp
            105              110              115

atc acc ccg atc gtc gac aac ccg gac gaa gcg ttc acc ggt ggc aag    1399
Ile Thr Pro Ile Val Asp Asn Pro Asp Glu Ala Phe Thr Gly Gly Lys
            120              125              130

ccc atc acc tgc gag agc acg ctc agc gat cac ggc aag acc ggt tat    1447
Pro Ile Thr Cys Glu Ser Thr Leu Ser Asp His Gly Lys Thr Gly Tyr
        135              140              145

cac ggc tat tgg ggc gtc aat ttt tac agg ctc gac gaa cat ctc ccc    1495
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21

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His Gly Tyr Trp Gly Val Asn Phe Tyr Arg Leu Asp Glu His Leu Pro
150             155             160                 165

agc ccg ggg ctg gat ttc gcc ggg ttc acg cgc gcc atg cac gcc aat    1543
Ser Pro Gly Leu Asp Phe Ala Gly Phe Thr Arg Ala Met His Ala Asn
                170             175                 180

gac ctg aag gtg gtg ctg gat atc gtc ggc aac cac ggc tcg ccc gcc    1591
Asp Leu Lys Val Val Leu Asp Ile Val Gly Asn His Gly Ser Pro Ala
                185             190                 195

tac agc atg ccg gtg gcg cag ccc ggg ttt ggc aag ctc tac gac gca    1639
Tyr Ser Met Pro Val Ala Gln Pro Gly Phe Gly Lys Leu Tyr Asp Ala
                200             205                 210

cag ggc cgc ctg gtt gcc gat cat cag aac ctc gca ccc gca cag ctc    1687
Gln Gly Arg Leu Val Ala Asp His Gln Asn Leu Ala Pro Ala Gln Leu
                215             220                 225

gac ccg gcg cac aac ccg ttg cac gcg ttc tac aac acc agc ggc ggc    1735
Asp Pro Ala His Asn Pro Leu His Ala Phe Tyr Asn Thr Ser Gly Gly
230                 235             240                 245

ctg gcg gaa ttg tcg gac ctc aat gaa gac aac ccg gct gtg ctg gac    1783
Leu Ala Glu Leu Ser Asp Leu Asn Glu Asp Asn Pro Ala Val Leu Asp
                250             255                 260

tat cta gcc ggc gcc tac ctg cag tgg atg gag cag ggt gcc gat gcg    1831
Tyr Leu Ala Gly Ala Tyr Leu Gln Trp Met Glu Gln Gly Ala Asp Ala
                265             270                 275

ttt cgc atc gac acc atc ggc tgg atg cca gac cgc ttc tgg cat gcc    1879
Phe Arg Ile Asp Thr Ile Gly Trp Met Pro Asp Arg Phe Trp His Ala
                280             285                 290

ttc gta gcg cgg atc cgc gag aaa cgc ccg ggc gtt ttc atg ttt ggc    1927
Phe Val Ala Arg Ile Arg Glu Lys Arg Pro Gly Val Phe Met Phe Gly
                295             300             305

gaa gcc ttc gac tac gac ccg gcc aag atc gcc ggc cac acc tgg gcg    1975
Glu Ala Phe Asp Tyr Asp Pro Ala Lys Ile Ala Gly His Thr Trp Ala
310                 315             320                 325

cgc aac gcc ggc gtc agc gtg ctg gac ttc ccg ctc aaa cag cag cta    2023
Arg Asn Ala Gly Val Ser Val Leu Asp Phe Pro Leu Lys Gln Gln Leu
                330             335                 340

tcc gcc gtg ttc ggc cac aaa cag gct ggc ttc gaa cag ctc gcc acg    2071
Ser Ala Val Phe Gly His Lys Gln Ala Gly Phe Glu Gln Leu Ala Thr
                345             350                 355

ccg ctg tat ctg cgc aaa ggc ccg tat ggc aac ccg tac gag ttg atg    2119
Pro Leu Tyr Leu Arg Lys Gly Pro Tyr Gly Asn Pro Tyr Glu Leu Met
                360             365                 370

agc ttc tac gac aac cac gac atg gcg cgc ctg gat gcc agc gat acc    2167
Ser Phe Tyr Asp Asn His Asp Met Ala Arg Leu Asp Ala Ser Asp Thr
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22

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ggc ttc atc gat gcg cac aat tgg ttg ttc acc gcg cgc ggc att ccg    2215
Gly Phe Ile Asp Ala His Asn Trp Leu Phe Thr Ala Arg Gly Ile Pro
390                 395                 400                 405

gtg atc tat tac ggc tcg gaa acc ggc ttc atg cgc ggg cgc gcc gaa    2263
Val Ile Tyr Tyr Gly Ser Glu Thr Gly Phe Met Arg Gly Arg Ala Glu
                410                 415                 420

cac gcg ggt aat cgc aat tat ttt ggc gaa gag cgc gtc agc aac gca    2311
His Ala Gly Asn Arg Asn Tyr Phe Gly Glu Glu Arg Val Ser Asn Ala
                425                 430                 435

ccg cag agc ccg atc ttc ggc ccg ctg cag cgc atc gcg acc ttg cgg    2359
Pro Gln Ser Pro Ile Phe Gly Pro Leu Gln Arg Ile Ala Thr Leu Arg
                440                 445                 450

cgc aat acc ccg gcc ctg cag cgc ggc gtg cag gtg gat ctg cag ttg    2407
Arg Asn Thr Pro Ala Leu Gln Arg Gly Val Gln Val Asp Leu Gln Leu
        455                 460                 465

cgc ggc aac cag gca gcg ttc ctg cgc gtc tac cag cat gcg ggc atg    2455
Arg Gly Asn Gln Ala Ala Phe Leu Arg Val Tyr Gln His Ala Gly Met
470                 475                 480                 485

acg cag acc gcg ttg gtc ttg ctc aac aag ggc gac gcg gcg gcg gac    2503
Thr Gln Thr Ala Leu Val Leu Leu Asn Lys Gly Asp Ala Ala Ala Asp
                490                 495                 500

att gcg gtg tcc cgc ttg ctg cag ccc ggc agc tgg cgc gac gcc ttc    2551
Ile Ala Val Ser Arg Leu Leu Gln Pro Gly Ser Trp Arg Asp Ala Phe
                505                 510                 515

agt ggc gag cag gtg cag gtg caa ggt cgc gtg acg ctg cag gtg ccg    2599
Ser Gly Glu Gln Val Gln Val Gln Gly Arg Val Thr Leu Gln Val Pro
                520                 525                 530

gcg cat ggc gtg cgc gtg ctg ctg tcg gat gcg ccg gtg acc gac gtc    2647
Ala His Gly Val Arg Val Leu Leu Ser Asp Ala Pro Val Thr Asp Val
                535                 540                 545

gcc cta cgc aag cag ctg gac gca cag atg gcg gac cag gcc gcg cgc    2695
Ala Leu Arg Lys Gln Leu Asp Ala Gln Met Ala Asp Gln Ala Ala Arg
550                 555                 560                 565

gat gca cgc aac aag tag gagcgcgcca gcgcgcgatg cggcgttatc    2743
Asp Ala Arg Asn Lys
                570

ggtgacgcct catcgcgcac aagtgcgctc ctacacaggc atcagtcggc tgcaatagcg    2803

tcagcaggtc gcgaccaaca acgatggcga ctcatccgcg cgacgcatgc tccaacgatt    2863

cccgcttccc gcttcccgct tcccgcttcc cgcttcccga ttcccgaatc tcagcgcgtc    2923

gcgtttccgc tcgccgcctt cccgcgcagc ccatcgctgg actccgcagc cgtcgacggg    2983
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23

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ttccacccca gcggcggttg caggccactg ctggtcgacg actcgcgcac cgccagccga    3043

accgggattg tgcggctctg tgcagcgtca ccacgaatca gcgccaccag gctttcgacc    3103

aacagggcgc cggcctgctt ggtgtcctgt tgcacggtcg atagtgctgg cgccaccgag    3163

gcagccaggg cgatgtcgtc gaagccgctg acggccacgt cctgcggcac gcgcagtccg    3223

cgttcgcgca gtgcccgcat cgcgccgatc gcaatcaaat cgctggccgc gcacaccgcg    3283

tcgaacgcct gcccgctgtc gagcagcgcc aggcacgcgg tgtaaccgga cagctcggtg    3343

gtaatcgcat cgaactgcag cgcggcatcc gccgccacac cctgtaacgc taacgctgcg    3403

acatgcccgc gatagcgctc ctcgaactcc gggtaatggt tggaggcgtg gccgagaaat    3463

gcgatccgcc ggcagccctg cgcgagcagg tgctcggtga tgtccagccc gccctgatag    3523

ttatcgctgc cgatcgaaat acccggttga cccggcagcg ccgcgcccca gcgtacgaag    3583

tgcgtgcctt gttcgaccag cagctgcagc cgctggcgtg attcctgata atcgccgtag    3643

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gacagctgct                                                            3713


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ggatgctgga agctgtcaac gcgcatctgg cgcgcaaggg ccagagcctg cggtcgggca     180

cgatcgtcga tgcgacgctg atcgcggcgc ccagttcgac caagaatgcc gaccatgcac     240

gcgaccccga gatgcgtcag accaagaagg gcaatcagtg gtatttcggg atgaaggccc     300

acatcggcgt ggatgaattt tccgggttgg tgcaccacgt ccattgcaca gccgccaacg     360

tcgccgacgt cacggtgacg cacacgttgc tgcatggcaa agaagacagc gtgttcggcg     420

acagcggcta caccggtgcg gataagcgcg aagaactgca ggactgcgag gctgcatttt     480

tcattgctgc caagcgttcg gtgcttcaag ccatcggcaa caagcgggag cgtgctcggg     540
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24

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aacagcgttg ggaacacttc aaggccagcg tgcgcgcgaa ggtggagcat ccgttccggg      600

tgatcaagcg ccagttcggt tacaccaagg tccgctatcg cggcctggcg aagaacaccg      660

cgcaggtgct gacgctgttt gcgctgtcaa acctgtggat gaagcgaaag cagttgatgc      720

ctgctatggg gagcgtgcgc ctgtaacgcg ggcaacaccc tgcaaacgcg ccggaaacgg      780

caaaaaatcg aggatctgag cgccgtcggc ctggccgatg tggttaggct catcctccga      840

cgccgttgat cagaccatcc ctaaagcggc caggaagcag atacgcagac gccagacagg      900

cgcgagcgtg gagatgcatc ggtatggact gagtgtccac gccaacggct ccgcgcatgc      960

gcctgcctgg cgtttgctcg ctacatggtg cttggggcgc tta ctt gcc ggc gcg     1015
                                               Leu Leu Ala Gly Ala
                                               1               5

acg cgc gtg ctc gct cag gat cga cat ctg cgg ctt ctc gct gcc gtc     1063
Thr Arg Val Leu Ala Gln Asp Arg His Leu Arg Leu Leu Ala Ala Val
              10              15                  20

ctt gcc cgg ctg cac att gaa cgg gta gtc cgg ctt cca cca cgc gcc     1111
Leu Ala Arg Leu His Ile Glu Arg Val Val Arg Leu Pro Pro Arg Ala
          25                  30                  35

ggc cgc cca cca ggt cca gcc cag cca cac gtc gct gtt ctt ttc cat     1159
Gly Arg Pro Pro Gly Pro Ala Gln Pro His Val Ala Val Leu Phe His
          40                  45                  50

gta gct cag cat gcc ttt cag cgc gtc gtt gca gac cgc att gtt ggc     1207
Val Ala Gln His Ala Phe Gln Arg Val Val Ala Asp Arg Ile Val Gly
    55                  60                  65

cgt gcc gaa ctc gcc cag gaa gcc ttt ctg ctt gtt ctc gcg cag cca     1255
Arg Ala Glu Leu Ala Gln Glu Ala Phe Leu Leu Val Leu Ala Gln Pro
70                  75                  80                  85

gtc ggt aaa gcc gcg caa ctt gtc tgc gcc cac cgt ggc act ggt gca     1303
Val Gly Lys Ala Ala Gln Leu Val Cys Ala His Arg Gly Thr Gly Ala
                90                  95                  100

ttc ggg ctt ggt gcc gct gta gtc gcc gtc cag gta ttg atg cgc ttc     1351
Phe Gly Leu Gly Ala Ala Val Val Ala Val Gln Val Leu Met Arg Phe
                105                 110                 115

gaa ggc cag att gtt gcc ggg gtc ctt gag aat ctg cag ggc ctt ggc     1399
Glu Gly Gln Ile Val Ala Gly Val Leu Glu Asn Leu Gln Gly Leu Gly
            120                 125                 130

att gga gac gcc gta gct ggt gct gcg cca gct gtg cgc gcc ggt gta     1447
Ile Gly Asp Ala Val Ala Gly Ala Ala Pro Ala Val Arg Ala Gly Val
        135                 140                 145

ggc cgt gcc agg cac cag aat caa att gtt cgc gcc ggt ctt gcg gat     1495
Gly Arg Ala Arg His Gln Asn Gln Ile Val Arg Ala Gly Leu Ala Asp
150                 155                 160                 165
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25

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ggt gtt gat cgc cgc ttg tgc ggc cgc ggc cca gtc ggt gga gga gat        1543
Gly Val Asp Arg Arg Leu Cys Gly Arg Gly Pro Val Gly Gly Gly Asp
                    170             175             180

gcc att ggg ctc gtt cat cag ccc gaa gat cac ctg ctt gtc gtc ttt        1591
Ala Ile Gly Leu Val His Gln Pro Glu Asp His Leu Leu Val Val Phe
                185             190             195

gaa ctc cag cgc cag gcg gcg cca cag atc ggc cag tgc tgc agg cgg        1639
Glu Leu Gln Arg Gln Ala Ala Pro Gln Ile Gly Gln Cys Cys Arg Arg
            200             205             210

cac ctc gtc ggt gcc gat gcg ctt tcc gtt gta ctt ggc gta gtt gtg        1687
His Leu Val Gly Ala Asp Ala Leu Ser Val Val Leu Gly Val Val Val
        215             220             225

cag gtc cag gat cag gaa ctg ctt gtt ggc ctt ggc ggc ggc cac gga        1735
Gln Val Gln Asp Gln Glu Leu Leu Val Gly Leu Gly Gly Gly His Gly
230             235             240             245

ttt ttt gat caa cgc cag ttg cgc cgc atc cag ctc gcc att gag ggt        1783
Phe Phe Asp Gln Arg Gln Leu Arg Arg Ile Gln Leu Ala Ile Glu Gly
                250             255             260

tgg ctg cag gcg ctc cca cag gaa cgg caa gcg aat ggt gtt cat gcc        1831
Trp Leu Gln Ala Leu Pro Gln Glu Arg Gln Ala Asn Gly Val His Ala
            265             270             275

ctt gct ggc gaa ata gct gaa atc cgc cgc cgc cgg gta ggt gta gtc        1879
Leu Ala Gly Glu Ile Ala Glu Ile Arg Arg Arg Arg Val Gly Val Val
            280             285             290

ctt gta gag cgt gcc ggg ctt ctt gcg cga gtt gaa ctc ggc gcc gga        1927
Leu Val Glu Arg Ala Gly Leu Leu Ala Arg Val Glu Leu Gly Ala Gly
        295             300             305

gat gtt gac gcc cac gta ctt caa tcc gcc gcgggcgttg tctgcctcct         1977
Asp Val Asp Ala His Val Leu Gln Ser Ala
310             315

tggcatgcgc caacggcaac gtggcgagca gggccagcgc cagtgcggca gcgtgggtgc     2037

gggtggagcg ggggagagat gggaacatgg gggagcctcc ttcggcagtc gacgtaggcg     2097

gccgcagggg gagggcacgg ccagcgagga tggtgcagcg ccacaccatc gatggtcagc     2157

ctaggggcct cggcgttagc gcgccattca cgcgggcaac gctgatttga tgatgcgcga     2217

acgtccaaag cgccatgctg gcgccacggt cgagttcgca agccgactgg caagacgcac     2277

tgtcgcagga gtgcgacgga gcggtgtcct aagctaacgc acctactttt ttgctgtctg     2337

cgccctgcgc gggcggcgtt ccgtcccct ggagtattcc catgagcaaa gcccacgcct      2397

acgccgccca aaccgccgac cagccgctgg cgccgttcgt cttcgaacgt cgcgcgcccg     2457
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gtcccgacga tgtgcagatc gacatcgcct actgcggtgt gtgccactcg gacctgcaca    2517

ccgcacgcaa cgaatggcac aacacggtgt atccctcggt gccgggccac gagatcgtgg    2577

gccgcgtcac tgccgtcggc agcgccgtga ccaacttcaa ggtcggtgac ctggccggtg    2637

tgggttgcat ggtcgacagc tgccgcagct gctcctcctg ccaggaaggc gaggagcaat    2697

attgcgaaca gggcttcacc ggcacctaca acggcccgat gtttggcggc ggcgagaaca    2757

cctatggcgg gtactccgac catatcgtgg tggaccagaa gtacgtgctg cacatttccc    2817

acagcgacaa cctggccgcc gtggccccgt tgttgtgcgc gggcatcacc acctattcgc    2877

cactggcgca ttggaaggtt ggccccgggc agaaggtggg cgtggtcggc ctgggtggcc    2937

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ggctgcgcag cagacctaca ccgacgtgct gccgagcttg aacctgcgct ggatgctgag     180

cgaccagctg cagtggcgtt ttgcggcctc gcgtggtatt tcgcgtccaa ccttcgaccg     240

tctcaacccg aacctgagcc tgagcaccgg cacctcgaac ggtgcttcga ccttcaccgg     300

caccgcgggt aacccgagcc tggaagcggt caaggctgac cagttcgaca ccgcgctgga     360

gtggtatttc ggccagggct cgatgatgta cggcaccctg ttctacaaga aggttgaagg     420

cttcatcgcc aacgccgtct tcaacgaggt gtacgacggc caggtgtggc agatcacccg     480

tccggtcaac ggcgatgccg gcaagatccg cggggcggaa ctgggttaca cgcagttctt     540

cgacttcctg ccgggctggc tgagcggctt cggcctgcag accaactaca cctacgtcga     600

cagcgaggcg ccgagcccga cggccaccga caccaacggc cagtcgctga cggtgccgct     660

ggaaggcctg tccaagaaca gctacaacgc gatcctcagc tacgaaacgg cgcgcttcca     720

gggccgtgtg gcctacaact ggcgcagcga ctggctggtg accaccgcgg caacggcac      780

tgaaaatctg ccggtctaca acaagggctt cggccagctg gatgcctcgc tgcgtttcaa     840
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27

catcaatgat gtgtggtcga tttcgctgga cggcgtgaat ctgctcgata cccgtcgcga   900

aagctatctc gggaccgagt cgcgctaccg cgactttgtg atcaacgatc gtcggtatgg   960

cctgactttg cgggccagcc tgtagaacgc gccgtaggaa gtg cgt cgc cgg tcc   1015
                                                             Val Arg Arg Arg Ser
                                                             1   5

ggc gag ctg tgc agg cag ctc gtt gga ctg gtg ttt ttc cta tcg acg   1063
Gly Glu Leu Cys Arg Gln Leu Val Gly Leu Val Phe Phe Leu Ser Thr
              10   15   20

gcg ttg ccg tcg atc gcg agg gga gcc gga gga atg atc gca atg atc   1111
Ala Leu Pro Ser Ile Ala Arg Gly Ala Gly Gly Met Ile Ala Met Ile
              25   30   35

gat ccg cct act aag cgc cgc acc acc aca aca gga gca tgg ctg gct   1159
Asp Pro Pro Thr Lys Arg Arg Thr Thr Thr Thr Gly Ala Trp Leu Ala
              40   45   50

gtc ttg agc ctg ctg ctg ttg ctc ttt tcg acg ccc agc gtg cgt gcg   1207
Val Leu Ser Leu Leu Leu Leu Leu Phe Ser Thr Pro Ser Val Arg Ala
      55   60   65

gcc gag ccc gcc acg tcc ggg ccc tac cag tgg cgc agt gtc gcc att   1255
Ala Glu Pro Ala Thr Ser Gly Pro Tyr Gln Trp Arg Ser Val Ala Ile
70   75   80   85

ggc ggt ggc ggc ttt gtc acc ggt gtg ctg ttt cat ccc gcc gaa cgt   1303
Gly Gly Gly Gly Phe Val Thr Gly Val Leu Phe His Pro Ala Glu Arg
                    90   95   100

ggt ctg gcc tat gcg cgc acc gat gtg ggt ggc gcg tac cgc tgg gat   1351
Gly Leu Ala Tyr Ala Arg Thr Asp Val Gly Gly Ala Tyr Arg Trp Asp
              105   110   115

gcg cag gcg cag cag tgg acc gcg ctg acc gac tgg ttg ggc gct gac   1399
Ala Gln Ala Gln Gln Trp Thr Ala Leu Thr Asp Trp Leu Gly Ala Asp
              120   125   130

gac tgg aac ctg atg ggc atc gac gca ttc gcc gtc gac ccc gcc gat   1447
Asp Trp Asn Leu Met Gly Ile Asp Ala Phe Ala Val Asp Pro Ala Asp
              135   140   145

gcc gat gcg ctg tat ctg gcg gcc ggc acc tat atg cat gaa cgc gcc   1495
Ala Asp Ala Leu Tyr Leu Ala Ala Gly Thr Tyr Met His Glu Arg Ala
150   155   160   165

ggc act gcc gca gtg ttg cgc tcg ttc aac cgc ggc cgc acg ttc gag   1543
Gly Thr Ala Ala Val Leu Arg Ser Phe Asn Arg Gly Arg Thr Phe Glu
              170   175   180

cgt gcc gac ctg ccg ttt aag ctg ggt ggt aac cag ctg ggc cgc gcc   1591
Arg Ala Asp Leu Pro Phe Lys Leu Gly Gly Asn Gln Leu Gly Arg Ala
              185   190   195

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aat ggc gag cgg ctg gcg gtg gac ccg cac gat ggc cgc gtg ctg ctg          1639
Asn Gly Glu Arg Leu Ala Val Asp Pro His Asp Gly Arg Val Leu Leu
        200                     205                 210

ctg ggc tcg cgc gat gcc ggc ctg tgg cgt agc gac gat cgc ggc gcg          1687
Leu Gly Ser Arg Asp Ala Gly Leu Trp Arg Ser Asp Asp Arg Gly Ala
        215                 220                 225

cac tgg gcg aag gtg gcg tcg ttt ccg gac gcc gcg ctg gcc ggt gcc          1735
His Trp Ala Lys Val Ala Ser Phe Pro Asp Ala Ala Leu Ala Gly Ala
230                     235                 240                 245

acc gcg cgc aat cat gtt ggg cgc gag cag gcg gtg ggg atc gcc ttt          1783
Thr Ala Arg Asn His Val Gly Arg Glu Gln Ala Val Gly Ile Ala Phe
                250                 255                 260

gtc gtg ttc gac gca gcc agt ggc aac aac ggc tcg cca aca ccg cgc          1831
Val Val Phe Asp Ala Ala Ser Gly Asn Asn Gly Ser Pro Thr Pro Arg
                265                 270                 275

atc tac gtg ggc gtg tcc acc gaa cag acc agc ctg tat gtg tcc gaa          1879
Ile Tyr Val Gly Val Ser Thr Glu Gln Thr Ser Leu Tyr Val Ser Glu
            280                 285                 290

gat gcc ggc cgc agt tgg gca ccg gtg gcc ggg caa cca cgc ggc ctg          1927
Asp Ala Gly Arg Ser Trp Ala Pro Val Ala Gly Gln Pro Arg Gly Leu
        295                 300                 305

cgc ccg agc cac atg gcc ggc ggc agc gat ggg cac tgg tat ctg agc          1975
Arg Pro Ser His Met Ala Gly Gly Ser Asp Gly His Trp Tyr Leu Ser
310                 315                 320                 325

tat ggc gac cag ccc ggg ccg gac ctg atg gcc ggg gga gcc ttg tgg          2023
Tyr Gly Asp Gln Pro Gly Pro Asp Leu Met Ala Gly Gly Ala Leu Trp
                330                 335                 340

aaa ttc acg ccg gca cag ggg cgc tgg cgt gag atc agc ccg att ccg          2071
Lys Phe Thr Pro Ala Gln Gly Arg Trp Arg Glu Ile Ser Pro Ile Pro
                345                 350                 355

cag cca gcc agt ggc gat gga ttc ggc tgg ggt gcg gtg gcg gtg gat          2119
Gln Pro Ala Ser Gly Asp Gly Phe Gly Trp Gly Ala Val Ala Val Asp
                360                 365                 370

ccg caa cat ccg cag gtg ctg ctg gcc agc acc ttc cgc cgt cgc acg          2167
Pro Gln His Pro Gln Val Leu Leu Ala Ser Thr Phe Arg Arg Arg Thr
        375                 380                 385

ccg cgc gac gag ctg tat cgc agc gtg gat ggt ggc aag cac tgg acg          2215
Pro Arg Asp Glu Leu Tyr Arg Ser Val Asp Gly Gly Lys His Trp Thr
390                 395                 400                 405

ccg ttg ttg gcc gat gcg gtg ttc gat cac agc gcc gcg ccg tgg acc          2263
Pro Leu Leu Ala Asp Ala Val Phe Asp His Ser Ala Ala Pro Trp Thr
                410                 415                 420

gca cat gcc acg ccg cac tgg atg ggg gcg ctg gcg atc gat ccg ttc          2311
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29

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Ala His Ala Thr Pro His Trp Met Gly Ala Leu Ala Ile Asp Pro Phe
            425                 430                 435

gac ggc aac cat gcg ctg ttc gtg acc ggc tac ggc atc tgg gcc tcg        2359
Asp Gly Asn His Ala Leu Phe Val Thr Gly Tyr Gly Ile Trp Ala Ser
            440                 445                 450

cgc aat ctg cag gat ttc gcc gca ccg cag cgc ccg ctg cag tgg tgg        2407
Arg Asn Leu Gln Asp Phe Ala Ala Pro Gln Arg Pro Leu Gln Trp Trp
            455                 460                 465

ttc cag gac cgt ggg ctg gaa gaa acc gtg ccg ctg gac ctg ctc agc        2455
Phe Gln Asp Arg Gly Leu Glu Glu Thr Val Pro Leu Asp Leu Leu Ser
470                 475                 480                 485

ccg atg gct ggc gcg cat ctg ctc agc gcg ctc ggc gat atc gac ggc        2503
Pro Met Ala Gly Ala His Leu Leu Ser Ala Leu Gly Asp Ile Asp Gly
                    490                 495                 500

ttc cgg cat gac gac ctg gac cgc gtg cag ttg cag tac gcc ggc cca        2551
Phe Arg His Asp Asp Leu Asp Arg Val Gln Leu Gln Tyr Ala Gly Pro
            505                 510                 515

cgg ctg acc aat ggc gaa agc atc gat gcc gcc ggc cag gcg ccg cag        2599
Arg Leu Thr Asn Gly Glu Ser Ile Asp Ala Ala Gly Gln Ala Pro Gln
            520                 525                 530

tgg gtg gtg cgc agc ggt acc gtg cgc gcc cgc cgc aac aac gaa atc        2647
Trp Val Val Arg Ser Gly Thr Val Arg Ala Arg Arg Asn Asn Glu Ile
            535                 540                 545

cgc gcg ctg tat tac gcg tga tggcggcaag caatggactg cgtttgcgag          2698
Arg Ala Leu Tyr Tyr Ala
550                 555

tgagccgcca gccgggcagg gcgccggcag cattgccatt ggtgccgatg cggcgcaggt      2758

ggtgtgggca ccggcgcgcg gcggcaattg gcgcacgtcc gacttcggcg cgcagtggca      2818

gcgtgtgaac gccctgccga accccgcgtg ggtggtgacc gatcgggtgg acgcacggcg      2878

ctggtatgcg gtggatgtcg ccagcgggca gctgtacgag agcaccgatg ccgcgcgcag      2938

tttccgtgcg accggtgtac aggtgggcag cccggcgcgc gatgagcgca cccggccgca      2998

gctgcgtccg gacccgtggc gcgcaggcgt ggtgtatctg ccagccccg gcaagggtgt       3058

gatgcgctgg caggacggtg cgctgcaggt gctctcacag ccggacgaag cacgctcgct      3118

gggcatcggc aaggcgctgc gggccggtgc gccgccggcg ctgtatctgg ccgggcgcgt      3178

gcagggcgtg gatggcgtgt ccgctccga cgatggcggc gcgcagtggc agcgcatcaa       3238

cgatgacgcg caccgcttcg gcgcccgta cagcgtgacc ggtgatccgc gcattgccgg       3298

gcgtgtgtac ttcgccaccg gcggccgcgg catttctac ggcgatccga gatgagcagt       3358
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30

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gcatgcctgt ccgcgacgtc ctgctgcttt accgtgtacg gcgccgccgg cctggccgct    3418

gcgggcgccg tgacaccgcc gaccctggag atcaccgcat gaccccgtcc cacatttccc    3478

gcgcctgctt gctgggtgtg ttgctggcca gcggcagcgc cgccgcgcaa ccgagcctgc    3538

cgttgctgtt tgccgatggc gcggtgctgc agcgcgatga ggcaatgccg gtatggggct    3598

gggccacgcc cggcgccgca atcacggtga gtttcgatgg caagcaggcc accgccaaga    3658

ccgatgcgca                                                           3668


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<212>       DNA
<213>       Xanthomonas campestris

<220>
<221>       CDS
<222>       (1001)..(2749)

<400>       22

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gggaccgggc gaatccgacg gcgccagcaa gtccatcgcc aacaaccagg gcaagggctt     120

cgacagatac tgcgacccga cctatacgac gccggacggc acgttgacgg gtgccttgcc     180

gaacgcgccg atcgccggta actggttcca cgcgcagttc ctccagttgg tcgccaacgc     240

gtatcccgcc atcggcacct cgaccaaggc ggcgctgcag tcggcgtcga ccgacgcggt     300

gcccgccagt cggccgacgg cgaccaaggg gttgaccgcc aatgcagcgg atggcgaggt     360

caggctcagc tggtcgcccg ttgccggtgc cacgggttac acggtgcaac gtgtcgccga     420

cgcaaccgct gctcccatca ccgtcgcatc gggcctgacc tcgccctcat atgtggacca     480

gacgctcacc aacggcacca cgtactacta caaggtaacg gccaacggcg catcgggtgc     540

agacgcgagc tcggtcaccg tgagcgcgac accgcatcgg tgatacgata actgcgttgc     600

cacagagcgg tagaggctag tgtgctctac cgctcctcgg ccgcgggagg agcgctgcaa     660

ccacgatggc ggcgccttgc gcccgccatt tcaatcgctg tcgtgctgct ctacctctgt     720

ctggagcgcg gcatgcgctt cgaatgagat gacatcggag cagatgccgt cgctggcgga     780

acgggcgctg catggcacag gctcggtagc gccacggcaa gcggcgcagc gtccactccg     840

tgccgctgac ggccaacccg gcctgtggca tgccgggact gcatcgcgcg cgttgccggg     900

gagctgcgcc cttttgtctc cacccgcaca ggccgcttcg cacgcaaccg tacataacac     960

actccagaag acgtccatgc catcacatat ccatttcttg atc gcg ctc gca acg    1015
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31

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ctc atc ccg gtc acc gcg ccg gcg atg cag gtc agt acg caa gct ccc    1063
Leu Ile Pro Val Thr Ala Pro Ala Met Gln Val Ser Thr Gln Ala Pro
            10              15              20

ctt gtc gat gca aca ggt cag acg ctg cac att cgc ggg gtc acc tgg    1111
Leu Val Asp Ala Thr Gly Gln Thr Leu His Ile Arg Gly Val Thr Trp
            25              30              35

ccc ggc ttc gat cgc gcc ggg ttg gcg gcc gtc ggc atg cgc aac aac    1159
Pro Gly Phe Asp Arg Ala Gly Leu Ala Ala Val Gly Met Arg Asn Asn
            40              45              50

aca ctg gcg caa ctg ctg gat cgg atg cag gcg tca gac atc aat gcc    1207
Thr Leu Ala Gln Leu Leu Asp Arg Met Gln Ala Ser Asp Ile Asn Ala
            55              60              65

gta cgt gtg ccg gtc tgc gcc gct gtt ctg caa cgc gcc cct gtg gca    1255
Val Arg Val Pro Val Cys Ala Ala Val Leu Gln Arg Ala Pro Val Ala
70              75              80              85

gct gca gaa gtt gcc ggc gat tcc acg ctg cgc gga tta gat tcc ttg    1303
Ala Ala Glu Val Ala Gly Asp Ser Thr Leu Arg Gly Leu Asp Ser Leu
            90              95              100

caa ctg ctc gac gca gtg gtg cat gcc gca agc cag cgc ggg atg cag    1351
Gln Leu Leu Asp Ala Val Val His Ala Ala Ser Gln Arg Gly Met Gln
            105             110             115

gtg atg ttc gcg ttt gca gat gga ggc tgc gat gac cgc gca ccg ctc    1399
Val Met Phe Ala Phe Ala Asp Gly Gly Cys Asp Asp Arg Ala Pro Leu
            120             125             130

ctg ggc gca cag cag caa gca tgg acg cgc ggc ctg gtt acg ctg gca    1447
Leu Gly Ala Gln Gln Gln Ala Trp Thr Arg Gly Leu Val Thr Leu Ala
            135             140             145

cgc cgc tat ggc ggc aac gcc aat gtc ctg ggc att gac ctt ggc agc    1495
Arg Arg Tyr Gly Gly Asn Ala Asn Val Leu Gly Ile Asp Leu Gly Ser
150             155             160             165

agc ggc tat cgc aat gcc agc tgg gca gga aac gcg gcg gat cag gat    1543
Ser Gly Tyr Arg Asn Ala Ser Trp Ala Gly Asn Ala Ala Asp Gln Asp
            170             175             180

tgg aac cgg gta gcg tcg cgc gca gtt gca agg gtg ctg gcg cag gca    1591
Trp Asn Arg Val Ala Ser Arg Ala Val Ala Arg Val Leu Ala Gln Ala
            185             190             195

ccg cgc tgg gtc gtc ggt gtg gaa ggt gtg ggc agc aat gcg gtg tgc    1639
Pro Arg Trp Val Val Gly Val Glu Gly Val Gly Ser Asn Ala Val Cys
            200             205             210

agt gac cca gag cgc aag gcg cct ggc agc aat ctt cag ccg ttc gcg    1687
Ser Asp Pro Glu Arg Lys Ala Pro Gly Ser Asn Leu Gln Pro Phe Ala
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tgc gtg ccg ctg gac atc gct cgc cga cac ttg gtg ttg atg ccg aag    1735
Cys Val Pro Leu Asp Ile Ala Arg Arg His Leu Val Leu Met Pro Lys
230                 235                 240                 245

ttg gcg ggc ccg gat cgc gat acg acc gat gct ttc gcc gca ccc gga    1783
Leu Ala Gly Pro Asp Arg Asp Thr Thr Asp Ala Phe Ala Ala Pro Gly
                    250                 255                 260

ttt gcg cag gca ctg ccc gcc atg tgg caa cgc gac ttc ggc caa ttc    1831
Phe Ala Gln Ala Leu Pro Ala Met Trp Gln Arg Asp Phe Gly Gln Phe
                265                 270                 275

gca atc gac cat gca gtg gta ccc gtc agc ctc ggc ggt gga ctg ggc    1879
Ala Ile Asp His Ala Val Val Pro Val Ser Leu Gly Gly Gly Leu Gly
            280                 285                 290

gat ggc gac ccg cgt gac ccg gca tgg caa acc gca ttg agc ggt tat    1927
Asp Gly Asp Pro Arg Asp Pro Ala Trp Gln Thr Ala Leu Ser Gly Tyr
            295                 300                 305

ttg gca aac gca gga ata cgc agc gca ttt ctc ggc agt tgg gaa acg    1975
Leu Ala Asn Ala Gly Ile Arg Ser Ala Phe Leu Gly Ser Trp Glu Thr
310                 315                 320                 325

ggc aat gcc aac aac ggc ggc ctg ttg gcg ccg gat ggc agc ccc cgc    2023
Gly Asn Ala Asn Asn Gly Gly Leu Leu Ala Pro Asp Gly Ser Pro Arg
                330                 335                 340

gca gac aaa ctg ctg atc ttg cgt cat gcc tgg ggc agg tta ccc gtg    2071
Ala Asp Lys Leu Leu Ile Leu Arg His Ala Trp Gly Arg Leu Pro Val
            345                 350                 355

atg ccc gcc att gcg aca gca acc ggc gac agc acg aag aat gcg agt    2119
Met Pro Ala Ile Ala Thr Ala Thr Gly Asp Ser Thr Lys Asn Ala Ser
            360                 365                 370

ggg aag aag ccg tgg aat agt act ttc acc ggc acc gcc acc gtg acc    2167
Gly Lys Lys Pro Trp Asn Ser Thr Phe Thr Gly Thr Ala Thr Val Thr
            375                 380                 385

ggc tcc ggc tac tct ggc ggc gcg ctc ctg ctg gac ccc att ccg agt    2215
Gly Ser Gly Tyr Ser Gly Gly Ala Leu Leu Leu Asp Pro Ile Pro Ser
390                 395                 400                 405

gat gcc ttc atc acc gcg ctc aac ccg gtg caa ctg aac ttc ggt ggc    2263
Asp Ala Phe Ile Thr Ala Leu Asn Pro Val Gln Leu Asn Phe Gly Gly
                410                 415                 420

gtc aag gcc gcg ctt gcc ggc gcg tac ctg cag gtg aac ggc ccc aag    2311
Val Lys Ala Ala Leu Ala Gly Ala Tyr Leu Gln Val Asn Gly Pro Lys
                425                 430                 435

ggc acc acc acg gtc tac gtg acc gac ctg tat ccg gag ggc gca tcc    2359
Gly Thr Thr Thr Val Tyr Val Thr Asp Leu Tyr Pro Glu Gly Ala Ser
            440                 445                 450
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33

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ggc ggc ctg gat cta tcg cac aac gcg ttc gcg gcg atc ggc gac atg        2407
Gly Gly Leu Asp Leu Ser His Asn Ala Phe Ala Ala Ile Gly Asp Met
    455             460             465

gtg cag ggg cgc atc ccg atc agc tgg aaa gtg gta cgc gcg ccg gtc        2455
Val Gln Gly Arg Ile Pro Ile Ser Trp Lys Val Val Arg Ala Pro Val
470             475             480             485

acc ggc aac ctg caa tac cgc atc aag gaa ggc agc tca cgc tgg tgg        2503
Thr Gly Asn Leu Gln Tyr Arg Ile Lys Glu Gly Ser Ser Arg Trp Trp
            490             495             500

gcg gcg atc cag gtg cgc aac cac gcc tat ccg gtg gtg aag ctg gag        2551
Ala Ala Ile Gln Val Arg Asn His Ala Tyr Pro Val Val Lys Leu Glu
        505             510             515

gtg aag caa ggc agc acc tgg aag aac ctg cag aag atg gac tac aac        2599
Val Lys Gln Gly Ser Thr Trp Lys Asn Leu Gln Lys Met Asp Tyr Asn
        520             525             530

cac ttc ctg ggc gag caa ctg ggc aac caa ccg cta acc ctg cgc atc        2647
His Phe Leu Gly Glu Gln Leu Gly Asn Gln Pro Leu Thr Leu Arg Ile
    535             540             545

acc gac att cgc ggc aag gtc ctc acc gat acc ttg cca cgt ctg cca        2695
Thr Asp Ile Arg Gly Lys Val Leu Thr Asp Thr Leu Pro Arg Leu Pro
550             555             560             565

gaa gac ggc agc aag ccg gcg tat ttc gaa ccg ggg cat gtg cag ttt        2743
Glu Asp Gly Ser Lys Pro Ala Tyr Phe Glu Pro Gly His Val Gln Phe
            570             575             580

ccg tag cgcgaacagg tggtttgcct gaactgagcg ttggattggt taacgggcgt        2799
Pro

ggacttgttt agatcgtttg cttgtctaga gcgacaagcg ctttcagcgc cgctagttga        2859

tctcgctggg tcagcccggt gcgtgcgagt cgctgtcacg caccggctgt acgcaccggc        2919

cgtcgccacg ttggtgcccg tgcaactgct tcacacacgc agcgccagag acacagtcat        2979

cagcttcagc gagccagcct tacgcagttg cgcgcgtgtg gccaacgctt ggccgctcga        3039

gtagagcacc gtgaatcgcc agcaataccg accaaatagc ggtatacgct aattggcgct        3099

gttgtaaacg gcaatgaggc catgctgtta ttaccatgcg cctctggcag cgaacgacgg        3159

cgcggcttct atgcaacgtc gcatcggcct ctacttgggt agtttcgccg gtgcaatcca        3219

ggtgcatcaa ccacccgcca ggccaccacc gacgcgcccg ggtaatgcct gatcgtcgtc        3279

gtcctcgggg ttgtcgagat cgcccacttc atcgtcgata ccgccgcgcc gtggcgaggg        3339

gtcgttcgag ggcggcaagt cgtcgtcgcg ttgcggcccc ggcgtgccgt gcaagcgaaa        3399

ctgcgagaca acggacgcag gcggatcggt gttgagcgaa tacaggatca tgcgtcatct        3459
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34

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ccggctggga acctgtgctc gacgctagtg cgcgcagcgc tagcaggccg tgagccgcag    3519

cgcgtgcgcg ctgacatgcc gttgacgctg agcgcgcacc gctgcgctgt ggttgcctgc    3579

gggccagtgg ctatcatggg gctccgccct ccaggccgcc gtcatgcgcc cacgtcttct    3639

gatcatgctg ctgctcctgt gcggcgccgc tacggcagca gcaccggcct cgcgcctgga    3699

tgcggtggtg cgcgccggcg tgctgcgcgt ctgcaccacc ggcgactacc               3749
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<211>   3668
<212>   DNA
<213>   Xanthomonas campestris

<220>
<221>   CDS
<222>   (1001)..(2668)

<400>   23

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atcccgaggt cttccgacac cggcatccag gtcagacgcg ctggttcgcg ttcactgcca     120

ggcaccggga atcgcaagct gtggcggaat gccccggaac cacgacgcca accgagactg     180

acatccaaca taatccaggg aaatatactt ttccgcccca ctcctaaagt cgaaaataaa     240

acatttctgg cagcattaaa taactttcga tattatcttt atgaatcaac tctccgaata     300

aacgatatcc gtctgcgtct gcgttggcgt tggcgttggc gttggcgtct ccacataatc     360

ggcatctgca ataactccac acctttcgca gatggtgagc gtagtcgtcc acagttccag     420

gatctgcttt attgtagagt tcgctttcta gaggccgcgc acggattcgc gccatcgatg     480

ctggccttct acgttcttcg cctcgccaga cagtctcccg tgcatctcca gccacacctt     540

gcctgcaagg cctgctgccg ttgtcgatca atacgccggc catgccggtc gatggtcgcg     600

gcaggcgggt cgacgaaagc gggcatgagc cgcaacgacg cggcacacaa tcgcccggtg     660

cgcctgggcg tcagcccgct gcagctgcgc tcaaacgggc aacggaatcg acgcattgcg     720

ccgaccgatg cgcgaatacg gcgagcagct tgaatgcgac ataccgcacc atctcctgcg     780

ccgatcgccc ccggcgcagg accaccgatg cacgcgcatc tggggcgcgt tcggttgcgc     840

acgtgcatca ctcaccccga gcgggcatcc atcgagagaa accaccagtc acggagaatc     900

acgcgacatc ttgatatttc actaattaca caccgtttca ccatttccca tctcaaggcg     960

aaattcaatg tcatcttcga caaacctccg accctgcgtc aca tcc aag ctc gcc    1015
                                             Thr Ser Lys Leu Ala
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35

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gtt tcg ttg ctg aca ggc gcg ctg ctc gtt ccc gtt gcc gca tcc gcc      1063
Val Ser Leu Leu Thr Gly Ala Leu Leu Val Pro Val Ala Ala Ser Ala
            10              15              20

cag agc cat gtc gac aac ccg ttt gtc ggc gcg agc ggg tat ctc aat      1111
Gln Ser His Val Asp Asn Pro Phe Val Gly Ala Ser Gly Tyr Leu Asn
            25              30              35

ccc gat tat tcg aag gaa gtc aac tcg tcg atc gtc aag gtc aag gat      1159
Pro Asp Tyr Ser Lys Glu Val Asn Ser Ser Ile Val Lys Val Lys Asp
        40              45              50

gtg caa ctg aaa gcc aag atg cag gtc gtc aag tcc tat ccg acc tcc      1207
Val Gln Leu Lys Ala Lys Met Gln Val Val Lys Ser Tyr Pro Thr Ser
    55              60              65

gtc tgg ctg gat tcg atc aac gcg atc tat ggc ggc tcg cgc aac gcc      1255
Val Trp Leu Asp Ser Ile Asn Ala Ile Tyr Gly Gly Ser Arg Asn Ala
70              75              80              85

ggc cgc cta agt ctg caa ggc cac ctg gat gcg gca ttg gcg cag aaa      1303
Gly Arg Leu Ser Leu Gln Gly His Leu Asp Ala Ala Leu Ala Gln Lys
            90              95              100

aag gcc aat acg cct atc acg gtc ggc ttt gtc att tac gac atg ccg      1351
Lys Ala Asn Thr Pro Ile Thr Val Gly Phe Val Ile Tyr Asp Met Pro
            105             110             115

ggg cgc gac tgc cat gcg ctg gcc tcc aac ggc gag cta cca ctg acg      1399
Gly Arg Asp Cys His Ala Leu Ala Ser Asn Gly Glu Leu Pro Leu Thr
            120             125             130

caa gcc ggc ttg cag cgc tac aag acc gaa tac atc gac gtc atc gca      1447
Gln Ala Gly Leu Gln Arg Tyr Lys Thr Glu Tyr Ile Asp Val Ile Ala
    135             140             145

tcg acg ttg gcc aat ccg aaa tac aaa gat ctt cgg atc gtc aac atc      1495
Ser Thr Leu Ala Asn Pro Lys Tyr Lys Asp Leu Arg Ile Val Asn Ile
150             155             160             165

atc gag ccg gac agc ctt ccg aat ctt gtc acc aat caa agc acg ccc      1543
Ile Glu Pro Asp Ser Leu Pro Asn Leu Val Thr Asn Gln Ser Thr Pro
            170             175             180

gcc tgc ggc cag gcg gca tcc agc ggc att tac gag gcc gcc atc aag      1591
Ala Cys Gly Gln Ala Ala Ser Ser Gly Ile Tyr Glu Ala Ala Ile Lys
            185             190             195

tac gcg ctc gac aag ctc cat gcc act ccc aat ctt tac aat tac ctg      1639
Tyr Ala Leu Asp Lys Leu His Ala Thr Pro Asn Leu Tyr Asn Tyr Leu
            200             205             210

gat atc ggc cat tcc ggc tgg ctg ggg tgg gat agc aac cgt agc ccg      1687
Asp Ile Gly His Ser Gly Trp Leu Gly Trp Asp Ser Asn Arg Ser Pro
            215             220             225
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36

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gca att tcg cta tac aca cgg gtc gtg cag gga acg gca gcc ggt ttg      1735
Ala Ile Ser Leu Tyr Thr Arg Val Val Gln Gly Thr Ala Ala Gly Leu
230             235             240             245

gcc agt gcg gat ggc ttc atc acc aac acc gcc aat tac acg ccg ctt      1783
Ala Ser Ala Asp Gly Phe Ile Thr Asn Thr Ala Asn Tyr Thr Pro Leu
            250             255             260

cat gag ccg aac ctg ccc aat ccg gac ctg acg atc ggt ggc cag ccc      1831
His Glu Pro Asn Leu Pro Asn Pro Asp Leu Thr Ile Gly Gly Gln Pro
            265             270             275

att cgc tcg tcc aac ttc tat caa tgg aac agt ttc ttc gac gaa tcg      1879
Ile Arg Ser Ser Asn Phe Tyr Gln Trp Asn Ser Phe Phe Asp Glu Ser
            280             285             290

acc tat gcg gaa gcg ctc tac aac ggc ttc gtc ggc gcg ggt tgg tcc      1927
Thr Tyr Ala Glu Ala Leu Tyr Asn Gly Phe Val Gly Ala Gly Trp Ser
            295             300             305

agc aag atc ggc ttt ctg atc gac acc ggt cgc aac ggc tgg ggc ggc      1975
Ser Lys Ile Gly Phe Leu Ile Asp Thr Gly Arg Asn Gly Trp Gly Gly
310             315             320             325

aaa gcg cgc cct gca tct gcc agc ggc aat gac atc aac acc tac gtg      2023
Lys Ala Arg Pro Ala Ser Ala Ser Gly Asn Asp Ile Asn Thr Tyr Val
            330             335             340

gac tcc gga cgc gtg gac cgt cgc ctc cat cgc ggc aac tgg tgc aat      2071
Asp Ser Gly Arg Val Asp Arg Arg Leu His Arg Gly Asn Trp Cys Asn
            345             350             355

cag agt ggt gcg ggg atc ggc atg ccg ccg acc gcg gca ccc ggc ggg      2119
Gln Ser Gly Ala Gly Ile Gly Met Pro Pro Thr Ala Ala Pro Gly Gly
            360             365             370

cat atc cat gcc ctt gtg tgg ggt aag gga ccg ggc gaa tcc gac ggc      2167
His Ile His Ala Leu Val Trp Gly Lys Gly Pro Gly Glu Ser Asp Gly
            375             380             385

gcc agc aag tcc atc gcc aac aac cag ggc aag ggc ttc gac aga tac      2215
Ala Ser Lys Ser Ile Ala Asn Asn Gln Gly Lys Gly Phe Asp Arg Tyr
390             395             400             405

tgc gac ccg acc tat acg acg ccg gac ggc acg ttg acg ggt gcc ttg      2263
Cys Asp Pro Thr Tyr Thr Thr Pro Asp Gly Thr Leu Thr Gly Ala Leu
            410             415             420

ccg aac gcg ccg atc gcc ggt aac tgg ttc cac gcg cag ttc ctc cag      2311
Pro Asn Ala Pro Ile Ala Gly Asn Trp Phe His Ala Gln Phe Leu Gln
            425             430             435

ttg gtc gcc aac gcg tat ccc gcc atc ggc acc tcg acc aag gcg gcg      2359
Leu Val Ala Asn Ala Tyr Pro Ala Ile Gly Thr Ser Thr Lys Ala Ala
            440             445             450
```

37

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ctg cag tcg gcg tcg acc gac gcg gtg ccc gcc agt cgg ccg acg gcg      2407
Leu Gln Ser Ala Ser Thr Asp Ala Val Pro Ala Ser Arg Pro Thr Ala
    455                 460                 465

acc aag ggg ttg acc gcc aat gca gcg gat ggc gag gtc agg ctc agc      2455
Thr Lys Gly Leu Thr Ala Asn Ala Ala Asp Gly Glu Val Arg Leu Ser
470                 475                 480                 485

tgg tcg ccc gtt gcc ggt gcc acg ggt tac acg gtg caa cgt gtc gcc      2503
Trp Ser Pro Val Ala Gly Ala Thr Gly Tyr Thr Val Gln Arg Val Ala
                490                 495                 500

gac gca acc gct gct ccc atc acc gtc gca tcg ggc ctg acc tcg ccc      2551
Asp Ala Thr Ala Ala Pro Ile Thr Val Ala Ser Gly Leu Thr Ser Pro
            505                 510                 515

tca tat gtg gac cag acg ctc acc aac ggc acc acg tac tac tac aag      2599
Ser Tyr Val Asp Gln Thr Leu Thr Asn Gly Thr Thr Tyr Tyr Tyr Lys
        520                 525                 530

gta acg gcc aac ggc gca tcg ggt gca gac gcg agc tcg gtc acc gtg      2647
Val Thr Ala Asn Gly Ala Ser Gly Ala Asp Ala Ser Ser Val Thr Val
    535                 540                 545

agc gcg aca ccg cat cgg tga tacgataact gcgttgccac agagcggtag        2698
Ser Ala Thr Pro His Arg
550                 555

aggctagtgt gctctaccgc tcctcggccg cgggaggagc gctgcaacca cgatggcggc   2758

gccttgcgcc cgccatttca atcgctgtcg tgctgctcta cctctgtctg gagcgcggca   2818

tgcgcttcga atgagatgac atcggagcag atgccgtcgc tggcggaacg ggcgctgcat   2878

ggcacaggct cggtagcgcc acggcaagcg gcgcagcgtc cactccgtgc cgctgacggc   2938

caacccggcc tgtggcatgc cgggactgca tcgcgcgcgt tgccggggag ctgcgccctt   2998

ttgtctccac ccgcacaggc cgcttcgcac gcaaccgtac ataacacact ccagaagacg   3058

tccatgccat cacatatcca tttcttgatc gcgctcgcaa cgctcatccc ggtcaccgcg   3118

ccggcgatgc aggtcagtac gcaagctccc cttgtcgatg caacaggtca gacgctgcac   3178

attcgcgggg tcacctggcc cggcttcgat cgcgccgggt tggcggccgt cggcatgcgc   3238

aacaacacac tggcgcaact gctggatcgg atgcaggcgt cagacatcaa tgccgtacgt   3298

gtgccggtct cgccgctgt tctgcaacgc gccctgtgg cagctgcaga agttgccggc     3358

gattccacgc tgcgcggatt agattccttg caactgctcg acgcagtggt gcatgccgca   3418

agccagcgcg ggatgcaggt gatgttcgcg tttgcagatg gaggctgcga tgaccgcgca   3478

ccgctcctgg gcgcacagca gcaagcatgg acgcgcggcc tggttacgct ggcacgccgc   3538

tatggcggca acgccaatgt cctgggcatt gaccttggca gcagcggcta tcgcaatgcc   3598
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38

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agctgggcag gaaacgcggc ggatcaggat tggaaccggg tagcgtcgcg cgcagttgca   3658

agggtgctgg                                                          3668


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aacaggctgg cggccgcatt ggccaggccc aggccggtgc attcgcggtt cttgttgctg    180

ggcgtgtcgg tgagttcatc gaccacgcgc gcggtcatca tcgattcgag caggcccacc    240

attgcgatgg ccagcgccgg cagcgcgatg atgcgcaagg tctccagcgt caacggcacg    300

ccgggccatt gcaggaacgg cagcgcggtg ggcagcttgc ccaggtcggc caccgtcttc    360

agcggcaggt gcagcgcgct gctggccacc gtgagcagca ggatgcacag cagcggcgac    420

ggaatggctg agacaccggg cagccgcaac cgcggcaggc cgtagatgat ggccaggccc    480

acgcccagcg tgacccaggt ggtggggttg gcaccgagca ggtgcggcag ctgcgcggcg    540

aagatcagca ccgccagcgc gttgacgaac ccggtccgca ccgagctgct gacaaagcgc    600

atcagcacgc ccaggcgcag cagcccgaac acgatctgca ccagcccggc gagcagcccg    660

gcggcgagca gatacggcaa cccatgcgtg gccaccagcg gcgcagccac cagcgccacc    720

gagccggcgg ctgcggaaat catcgccggc cgtccgccac aaaacgcgat cacgatgccg    780

atcacaaacg acgcgaacaa gccgacctgc gggtccacgc ctgcgacgaa cgcaaaggcg    840

atgacttcgg gaatcagggc gaacgtggca acggcgccag ccatcagttc gcgcgcaggc    900

gaggcgcgcc attgcgccag ttcggtgcgc aggaaggaca tggggggacac tccagggaca    960

agaacgacag tcctgcggac agcgcgcagg gggcactagt gtg cgg gaa agc gac    1015
                                               Val Arg Glu Ser Asp
                                               1               5
```

39

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cgc tcc cgc agc cgc gat gtg atc ggt gcg gca atg gtg ttt tct gtg    1063
Arg Ser Arg Ser Arg Asp Val Ile Gly Ala Ala Met Val Phe Ser Val
                10                  15                  20

ggg acg atc aca cca cgc gac gcg cgc aca gac caa gat gcc cgc ctt    1111
Gly Thr Ile Thr Pro Arg Asp Ala Arg Thr Asp Gln Asp Ala Arg Leu
            25                  30                  35

acc gcg ctc ggg tgt cga gcc cgg ttc tct agg gag atc acc atg tcc    1159
Thr Ala Leu Gly Cys Arg Ala Arg Phe Ser Arg Glu Ile Thr Met Ser
            40                  45                  50

ata ttc agg acc gca agc acg ctc gct ttg gcc acc gcc ctc gca ctg    1207
Ile Phe Arg Thr Ala Ser Thr Leu Ala Leu Ala Thr Ala Leu Ala Leu
    55                  60                  65

gcc gcc ggg ccg gcc ttc agc tat tcc atc aac aac agc agg cag atc    1255
Ala Ala Gly Pro Ala Phe Ser Tyr Ser Ile Asn Asn Ser Arg Gln Ile
70                  75                  80                  85

gtc gac gac agc ggc aag gtc gtg cag ctc aag ggt gtg aac gtg ttc    1303
Val Asp Asp Ser Gly Lys Val Val Gln Leu Lys Gly Val Asn Val Phe
                90                  95                  100

ggc ttc gaa acc ggc aac cac gtg atg cat ggc ctg tgg gca cgc aac    1351
Gly Phe Glu Thr Gly Asn His Val Met His Gly Leu Trp Ala Arg Asn
                105                 110                 115

tgg aag gac atg atc gtg cag atg cag ggc ctg ggc ttc aac gcc gtg    1399
Trp Lys Asp Met Ile Val Gln Met Gln Gly Leu Gly Phe Asn Ala Val
                120                 125                 130

cgc ctg ccg ttc tgc ccg gcc acg ctg cgt agc gac acc atg ccg gcc    1447
Arg Leu Pro Phe Cys Pro Ala Thr Leu Arg Ser Asp Thr Met Pro Ala
    135                 140                 145

agc atc gac tac agc cgc aac gcc gac ctg cag ggc ctg acc tcg ctg    1495
Ser Ile Asp Tyr Ser Arg Asn Ala Asp Leu Gln Gly Leu Thr Ser Leu
150                 155                 160                 165

cag atc ctc gac aag gtg atc gcc gaa ttc aat gcg cgc ggc atg tat    1543
Gln Ile Leu Asp Lys Val Ile Ala Glu Phe Asn Ala Arg Gly Met Tyr
                170                 175                 180

gtg ctg ctg gat cac cac acc ccc gat tgc gcc ggc att tcc gag ctc    1591
Val Leu Leu Asp His His Thr Pro Asp Cys Ala Gly Ile Ser Glu Leu
                185                 190                 195

tgg tac acc ggc tcc tat acc gag gca cag tgg ctg gcc gac ctg cgc    1639
Trp Tyr Thr Gly Ser Tyr Thr Glu Ala Gln Trp Leu Ala Asp Leu Arg
            200                 205                 210

ttt gtg gcc aac cgc tac aag aac gtg ccg tat gta ctc ggc ctg gat    1687
Phe Val Ala Asn Arg Tyr Lys Asn Val Pro Tyr Val Leu Gly Leu Asp
    215                 220                 225
```

40

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ctg aag aac gaa ccg cac ggc gcc gcc acc tgg ggt acc ggc aac gcc      1735
Leu Lys Asn Glu Pro His Gly Ala Ala Thr Trp Gly Thr Gly Asn Ala
230             235             240             245

gcc acc gat tgg aac aag gct gcc gag cgc ggc tcg gcc gcg gtg ttg      1783
Ala Thr Asp Trp Asn Lys Ala Ala Glu Arg Gly Ser Ala Ala Val Leu
            250             255             260

gcg gtc gcg ccg aaa tgg ctg atc gcg gtg gaa ggc atc acc gac aac      1831
Ala Val Ala Pro Lys Trp Leu Ile Ala Val Glu Gly Ile Thr Asp Asn
            265             270             275

ccg gtg tgc tcc acc aac ggc ggc atc ttc tgg ggc ggc aac ctg cag      1879
Pro Val Cys Ser Thr Asn Gly Gly Ile Phe Trp Gly Gly Asn Leu Gln
            280             285             290

ccg ctg gcc tgc acc ccg ctc aac atc ccg gcc aac cgc ctg ctg ctg      1927
Pro Leu Ala Cys Thr Pro Leu Asn Ile Pro Ala Asn Arg Leu Leu Leu
            295             300             305

gcc ccg cac gtg tac ggc ccg gac gtg ttc gtg cag tcg tac ttc aac      1975
Ala Pro His Val Tyr Gly Pro Asp Val Phe Val Gln Ser Tyr Phe Asn
310             315             320             325

gac agc aac ttc ccc aac aac atg ccc gcc atc tgg gaa cgc cat ttc      2023
Asp Ser Asn Phe Pro Asn Asn Met Pro Ala Ile Trp Glu Arg His Phe
            330             335             340

ggt cag ttc gcc ggc acg cat gcg ctg ttg ctg ggc gag ttc gat ggc      2071
Gly Gln Phe Ala Gly Thr His Ala Leu Leu Leu Gly Glu Phe Asp Gly
            345             350             355

aag tac ggc gaa ggc gac gca cgc gac aag acc tgg cag gac gcg ctg      2119
Lys Tyr Gly Glu Gly Asp Ala Arg Asp Lys Thr Trp Gln Asp Ala Leu
            360             365             370

gtg aag tac ctg cgc agc aag ggc atc aac cag ggc ttc tac tgg tcg      2167
Val Lys Tyr Leu Arg Ser Lys Gly Ile Asn Gln Gly Phe Tyr Trp Ser
            375             380             385

tgg aat ccc aac agc ggc gac acc ggc ggc atc ctg cgc gat gac tgg      2215
Trp Asn Pro Asn Ser Gly Asp Thr Gly Gly Ile Leu Arg Asp Asp Trp
390             395             400             405

acc agc gtg cgc cag gac aag atg acc ctg ctg cgc acg ctg tgg ggc      2263
Thr Ser Val Arg Gln Asp Lys Met Thr Leu Leu Arg Thr Leu Trp Gly
            410             415             420

acc gcc ggc aat acc acg ccg acg ccg act ccc aca cct acg ccc aca      2311
Thr Ala Gly Asn Thr Thr Pro Thr Pro Thr Pro Thr Pro Thr Pro Thr
            425             430             435

ccg aca ccg acg cct acc ccc acg ccg acg ccc acc ccg ggc acc agc      2359
Pro Thr Pro Thr Pro Thr Pro Thr Pro Thr Pro Thr Pro Gly Thr Ser
            440             445             450

acc ttc agc acc aag gtg atc gtg gac aac agc tgg aac ggc ggc tat      2407
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41

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Thr Phe Ser Thr Lys Val Ile Val Asp Asn Ser Trp Asn Gly Gly Tyr
    455                 460                 465

tgc aac cgc gtg cag gtg acc aac acc ggc acc gcc agc ggc acc tgg     2455
Cys Asn Arg Val Gln Val Thr Asn Thr Gly Thr Ala Ser Gly Thr Trp
470             475                 480                 485

tcg atc gcg gtg ccg gtc acc ggt acg gtc aac aac gcc tgg aat gcg     2503
Ser Ile Ala Val Pro Val Thr Gly Thr Val Asn Asn Ala Trp Asn Ala
                490                 495                 500

acc tgg tcg cag agc ggc agc acg ctc aga gcc agc ggc gtg gac ttc     2551
Thr Trp Ser Gln Ser Gly Ser Thr Leu Arg Ala Ser Gly Val Asp Phe
            505                 510                 515

aac cgc acc ctg gca gcc ggc gcc acc gcc gag ttc ggc ttc tgc gcc     2599
Asn Arg Thr Leu Ala Ala Gly Ala Thr Ala Glu Phe Gly Phe Cys Ala
        520                 525                 530

gcg agc tga gtgcactgtg gcgggtacgg ctcccgtgtc cgctacccttt           2648
Ala Ser
    535

gcaacatgca gtggcattgt ggaggcgctg cgtagcaggt tgatgatcac ctgcggcgcc   2708

taacccacga cctcgtagga gctttacctc attctcacgg aaaccatacc ctatcatccc   2768

aactagcacc cccacctctt catcctccca atctcccccc ttcacgacat acatcaataa   2828

aaatacgatc ggcatcatca ccctacctct ccattcccag cacctaaaca aaactccact   2888

cgctccaacc atccacaatc cctcgtacca cgacgctcca catacataat aaacatccta   2948

actctacggt agtccacata gactctcacg tcatctcagc taactaccaa ttccttctgc   3008

ccctcaagta tatactattc tcaccaccac agttctaccc tgtcatcgac aaatacgatt   3068

cagatcatgc gccttccgcc aggcacacac gagtaccacc tccccagaaa tnaataacgc   3128

tactccacaa ccacgtaaca agattctagc acatatacan tccatagaac aacctcacga   3188

gcaactatat tcgaatctgc gttctactta catgcactac ggcatacata atcttcaggt   3248

ttcgcatgtc acctacgtcc                                               3268


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tgggcaaacc gccgcaaggt cgggatctcg tgcagtgctt cttccatcgc cggatcgctc     180

aacgcatacc actgctgcag caaatgaatc cgcaacatcg tcgccagtgc gtacggctgc     240

cgacctggcc ggcccgacac gggatagtgc ggcgcgacca gcccgagcag ttgctgccac     300

gggacgacct gctccatctc ggccaggaag atctcccggc gggtctgctt gcgcttgccc     360

aggccctcag cgtcaccgaa cgtcagttgc atggatcact cctcaacatc aggcgggtag     420

tgtcgcgtat ttgtggtgcg ttgttcagag gttccttagc gcagccaact gcgaacgatg     480

cacgagtgac gctggcgatg tctgccacct cgcgcgccat ttctgcagcg cgtttgtgga     540

actgccacgt gcgcgtgcat cggctcgcag ccacataggc aaccgtgatc acgcgggcgc     600

accgcggtcg ttgcggtgtg gctgcccatg ctgcagtgat cccccgcatg cagtgtttct     660

aggcaggcag ttttttcgcc acaggtctct tggccgacgc gccacgcgcg tcgttgcaag     720

ctgcgcgcac gcgtccatac atgggcatga caaagtgcct ctgtcgcgga tgcgtcgacc     780

agatcctgcc gccactgcga aacaccgcac agcttggaag agtgatacct cgcatctgta     840

gtttcagcgt gccgttgcgc ctagggtaga gacagatgcg ctgttggccg gtcgcgcgg      900

catgacgttg cgggcagcgt atctcccccg caactgcaag gaacacccca tgtctgcctc     960

cccctcctgg ccacgccagc tgctgcgctg cgcgttggtc atg ctg tgc atc gcc    1015
                                            Met Leu Cys Ile Ala
                                            1                   5

acg atg tcc atc gca cag gcg caa agc ccc aat cgt ctg aaa tac gca    1063
Thr Met Ser Ile Ala Gln Ala Gln Ser Pro Asn Arg Leu Lys Tyr Ala
                10                  15                  20

ggc gtc aac atc tcc ggt gcg gag atc cag tcg tcc aaa aaa ccg ggc    1111
Gly Val Asn Ile Ser Gly Ala Glu Ile Gln Ser Ser Lys Lys Pro Gly
            25                  30                  35

gtg ctc aat atc gac tac cgc tat cca acc gcg tcc gag tac agg tac    1159
Val Leu Asn Ile Asp Tyr Arg Tyr Pro Thr Ala Ser Glu Tyr Arg Tyr
        40                  45                  50

ttc gcg ggc aag caa atg aac atc gtg cgc ctg ccg atc ctg tgg gag    1207
Phe Ala Gly Lys Gln Met Asn Ile Val Arg Leu Pro Ile Leu Trp Glu
    55                  60                  65

cgc atg cag ccc aaa gct caa ggt ccg ctg gat cag gca caa ctg gca    1255
Arg Met Gln Pro Lys Ala Gln Gly Pro Leu Asp Gln Ala Gln Leu Ala
70                  75                  80                  85

ttg ctg aag cag gca gtg gcc aac gcc aag gcc gcc aat caa tac ctg    1303
Leu Leu Lys Gln Ala Val Ala Asn Ala Lys Ala Ala Asn Gln Tyr Leu
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43

Leu Leu Lys Gln Ala Val Ala Asn Ala Lys Ala Ala Asn Gln Tyr Leu
             90   95   100

att atc gat gtg cac aac tac gcc aag tac tac ggc cag aag att ggc   1351
Ile Ile Asp Val His Asn Tyr Ala Lys Tyr Tyr Gly Gln Lys Ile Gly
             105   110   115

agt aag cgg gtg ccg gtg cgc acg ttc acc gat ctc tgg cgc cgt ctg   1399
Ser Lys Arg Val Pro Val Arg Thr Phe Thr Asp Leu Trp Arg Arg Leu
             120   125   130

gcc atc gcg ttc aag agc gac aac gcc gtg att ttc ggg ctg atg aac   1447
Ala Ile Ala Phe Lys Ser Asp Asn Ala Val Ile Phe Gly Leu Met Asn
             135   140   145

gag ccg tac gac atc tcg cca gag agt tgg gcc gcc gcc gcg cag gcg   1495
Glu Pro Tyr Asp Ile Ser Pro Glu Ser Trp Ala Ala Ala Ala Gln Ala
150   155   160   165

tcc atc gac agc att cgt gcc acc ggt gcc acc aac ctg att ctg gtg   1543
Ser Ile Asp Ser Ile Arg Ala Thr Gly Ala Thr Asn Leu Ile Leu Val
                 170   175   180

ccc ggt gca ttg tgg tcg ggc gca cac agc tgg tat tcc acc gtg gcc   1591
Pro Gly Ala Leu Trp Ser Gly Ala His Ser Trp Tyr Ser Thr Val Ala
                 185   190   195

ggg cag tcc aat gca gtg gcg ctt gcg aac atc cgc gac cca ttg aat   1639
Gly Gln Ser Asn Ala Val Ala Leu Ala Asn Ile Arg Asp Pro Leu Asn
             200   205   210

cgc tat gcg atc gaa gtc cat caa tac ctg gac acc gac tcc agc ggc   1687
Arg Tyr Ala Ile Glu Val His Gln Tyr Leu Asp Thr Asp Ser Ser Gly
             215   220   225

acc agt gcc ggt tgt gtg agc cgc acg atc ggt gcg gag cgc ttg cgc   1735
Thr Ser Ala Gly Cys Val Ser Arg Thr Ile Gly Ala Glu Arg Leu Arg
230   235   240   245

agt ttc acc ggc tgg ctg cgc gcg caa ggc aag cgc ggt ttt ctt ggc   1783
Ser Phe Thr Gly Trp Leu Arg Ala Gln Gly Lys Arg Gly Phe Leu Gly
                 250   255   260

gaa ttc ggc acc gcc aat aac gca acc tgc act gcg gcg ctg gac ggc   1831
Glu Phe Gly Thr Ala Asn Asn Ala Thr Cys Thr Ala Ala Leu Asp Gly
                 265   270   275

atg ctc ggt tat ctc gaa acc aac cac gat gtg tgg atc ggt tgg acg   1879
Met Leu Gly Tyr Leu Glu Thr Asn His Asp Val Trp Ile Gly Trp Thr
                 280   285   290

ttc tgg gcg gca ggc gcg tgg tgg aac acc agc tat ccg ttc aat gtg   1927
Phe Trp Ala Ala Gly Ala Trp Trp Asn Thr Ser Tyr Pro Phe Asn Val
                 295   300   305

cag ccc gat gcg caa ggc cgc gac aag ccg cag atg aaa acc ttg agc   1975
Gln Pro Asp Ala Gln Gly Arg Asp Lys Pro Gln Met Lys Thr Leu Ser

44

gca cgc gcg cat cgc gtc acc cga taa cgggcatcga tcagttcgct   2022
Ala Arg Ala His Arg Val Thr Arg
                    330

tgtgtacaac tgcagcagcc gacgcacgca gtagacctgt actgctggtg cgtcggttgc   2082

atgcgtagcc ggagatttgg cgtcacgctt tcgtcgccta gcaaatcgca tgtcgagatt   2142

tcgtcgcggt cgcgtcacgc gtgaaagcgc aatctccctt gaaagcaggc acaaccgcac   2202

gaacccggtg ccagctcctc ccacgccgca taaagtgcag gccacaacgc agtttgtttg   2262

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gactggaatg aacgtgattc gcctgccgat cctgtgggaa cgtctgcaac ctgccgcacg   2682

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atcgggcatg tatctggtgc tggatatcca caactacagc aagtactacg gttataaaat   2802

gggtgggccg gaagtgccgc tcgccacctt gccgatctg tggcggcgcc tggcggtgat   2862

cttcaacagc gataacgccg tgatcttcgg gctgatgaat gagcccaaca acatctctgc   2922

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caatctgatc ctggtaccgg   3002

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ctggtattcc accgtggccg ggcagtccaa tgcagtggcg cttgcgaaca tccgcgaccc   180

45

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cactgcggcg ctggacggca tgctcggtta tctcgaaacc aaccacgatg tgtggatcgg    420

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gtagacctgt actgctggtg cgtcggttgc atgcgtagcc ggagatttgg cgtcacgctt    660

tcgtcgccta gcaaatcgca tgtcgagatt tcgtcgcggt cgcgtcacgc gtgaaagcgc    720

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gtcgtgttct ctgtggttgc gcaggctaat gtcctgcgcg gtg ttc ttc ctg ctg    1015
                                           Val Phe Phe Leu Leu
                                           1               5

ctc ggt gtt ctg ccg atg ggc cat gca caa acg cgt gca ctc aag tac    1063
Leu Gly Val Leu Pro Met Gly His Ala Gln Thr Arg Ala Leu Lys Tyr
              10              15                  20

gcc ggc gtc aat ttg gcg ggt gcg gaa ttt gcg tca tcg aaa aaa cct    1111
Ala Gly Val Asn Leu Ala Gly Ala Glu Phe Ala Ser Ser Lys Lys Pro
              25              30                  35

ggc gtc ctc aac aag gac tac atg tat ccc gcc agc acc gat tac agc    1159
Gly Val Leu Asn Lys Asp Tyr Met Tyr Pro Ala Ser Thr Asp Tyr Ser
              40              45                  50

tat ttc gct ggg act gga atg aac gtg att cgc ctg ccg atc ctg tgg    1207
Tyr Phe Ala Gly Thr Gly Met Asn Val Ile Arg Leu Pro Ile Leu Trp
   55              60                  65

gaa cgt ctg caa cct gcc gca cgc ggc gag ctg gat ccg gcg cag ctg    1255
Glu Arg Leu Gln Pro Ala Ala Arg Gly Glu Leu Asp Pro Ala Gln Leu
70                  75                  80                  85

gca ctg gtg cag caa gcg gtg gca cgc gcc aag gca tcg ggc atg tat    1303
Ala Leu Val Gln Gln Ala Val Ala Arg Ala Lys Ala Ser Gly Met Tyr
                  90                  95                  100

ctg gtg ctg gat atc cac aac tac agc aag tac tac ggt tat aaa atg    1351
Leu Val Leu Asp Ile His Asn Tyr Ser Lys Tyr Tyr Gly Tyr Lys Met
```

46

```
ggt ggg ccg gaa gtg ccg ctc gcc acc ttt gcc gat ctg tgg cgg cgc   1399
Gly Gly Pro Glu Val Pro Leu Ala Thr Phe Ala Asp Leu Trp Arg Arg
        120                 125                 130

ctg gcg gtg atc ttc aac agc gat aac gcc gtg atc ttc ggg ctg atg   1447
Leu Ala Val Ile Phe Asn Ser Asp Asn Ala Val Ile Phe Gly Leu Met
        135                 140                 145

aat gag ccc aac aac atc tct gcc agc gaa tgg gcc ggt gca gcg cag   1495
Asn Glu Pro Asn Asn Ile Ser Ala Ser Glu Trp Ala Gly Ala Ala Gln
150                 155                 160                 165

gca ggc atc gat gcg atc cgt gcc acc ggc gcc aac aat ctg atc ctg   1543
Ala Gly Ile Asp Ala Ile Arg Ala Thr Gly Ala Asn Asn Leu Ile Leu
                170                 175                 180

gta ccg ggc gcg ctg tgg acc ggc gca cac agc tgg cac tcg ctg acc   1591
Val Pro Gly Ala Leu Trp Thr Gly Ala His Ser Trp His Ser Leu Thr
                185                 190                 195

agc gat ggg tat tcc aat gca acc gcg ttg gca tcg atc agc gac cct   1639
Ser Asp Gly Tyr Ser Asn Ala Thr Ala Leu Ala Ser Ile Ser Asp Pro
                200                 205                 210

ctc aat cgc tat gcg ttc gaa gtg cat caa tat ctg gat gcc gat tcc   1687
Leu Asn Arg Tyr Ala Phe Glu Val His Gln Tyr Leu Asp Ala Asp Ser
        215                 220                 225

agc ggc acc tcc agt gtc tgc gtc agt gaa acc atc ggc gcc gat cgc   1735
Ser Gly Thr Ser Ser Val Cys Val Ser Glu Thr Ile Gly Ala Asp Arg
230                 235                 240                 245

ctg cgt gcg ttc acc gaa tgg cta cgc acc aac aac aag cgt ggt ttt   1783
Leu Arg Ala Phe Thr Glu Trp Leu Arg Thr Asn Asn Lys Arg Gly Phe
                250                 255                 260

ctc ggt gag ttc ggc acc gcc aac aac gcc gtc tgc aat acc gcg ctg   1831
Leu Gly Glu Phe Gly Thr Ala Asn Asn Ala Val Cys Asn Thr Ala Leu
                265                 270                 275

caa ggc atg ctg gcc tac atg gaa aac tac gcc gat gtc tgg ctg ggc   1879
Gln Gly Met Leu Ala Tyr Met Glu Asn Tyr Ala Asp Val Trp Leu Gly
        280                 285                 290

tgg aca tgg tgg gca gcg ggc gca tgg tgg aac acc agc tac gcc tac   1927
Trp Thr Trp Trp Ala Ala Gly Ala Trp Trp Asn Thr Ser Tyr Ala Tyr
        295                 300                 305

aac gtg cat ccg aac aag gac ggc acc gac aag ccg cag atg gtc atc   1975
Asn Val His Pro Asn Lys Asp Gly Thr Asp Lys Pro Gln Met Val Ile
310                 315                 320                 325

ctc tcg ccg cag gcc gcg cgc gct aca cgc tga cacgttgtcg catgcccgcc   2028
Leu Ser Pro Gln Ala Ala Arg Ala Thr Arg
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47

tttcgtagga gg   2040

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aaccaatgac atcgccttag cgctgcagcc gtcacgctag gtcatcacgc ctcgcagcag   180

gcgcattggc tggaactcca tgtctcgcat tctgttgatc ggcggccacg gcaaggtggc   240

gcgtctgctc accccgctgc tgctggccgg tggccaccac gtcaccgcgc tattccgtaa   300

tcccgaccac gcaagcgatg tgatcgccga tggcgccaca cccgcgctat tcgatatcga   360

acacgccgac accgcggcga tcgccgcgca catcaccggc cacgatgcag ttgtttggtc   420

ggccggtgcc ggcggtggcg atgccgcacg cacctatgcg gtggaccgcg atgccgcgat   480

ccgctcgatg cacgcggccg agcaggcgcg ggtgcggcgc tacgtgatgg tgtcctacct   540

gggcgcgggg ctggagcacg gggtgagccc ggaggatggc ttcttcgctt atgcgcaggc   600

caaggccgct gccgatgcgc acctgcgcgg caccacgctg gactggaccg tgcttgggcc   660

cggccggctc accctggacc cacccagcgg ctgcatcgcc cgcgacccgg gcagcgacac   720

caccgagggc gtatcgcgcg ccaatgtcgc gcaggtgatc gccgccaccc tggccacgcc   780

ggccaccatc ggcaagaccg tgggattcgt ggatgggccc acccccatca cgcaggcgct   840

cgcgcagctg gcatgaacgc cagccggtcc gcagcgcgct gccatggcaa gggccgctgg   900

cagctaacga tttcctaaag tcgcaccgcg catagtcgcc ggcgcagccc ccactgtgga   960

gatcgctatg tctgcgtttg ttgcgccccg ccgcgccggc atc ctg ccg ccg tat   1015
                                               Ile Leu Pro Pro Tyr
                                               1   5

ctg ctg gac cac gtg gcg cag gcc gca ccg gag cgc gca cgg cac tgc   1063
Leu Leu Asp His Val Ala Gln Ala Ala Pro Glu Arg Ala Arg His Cys
            10   15   20

gcg cag ctc acc cgc cac atc acc gcg cag ctg cgc cag cgc cgc gcg   1111
Ala Gln Leu Thr Arg His Ile Thr Ala Gln Leu Arg Gln Arg Arg Ala

48

```
cag ggg ttg ctg gcg cgc gac agc gcc gac gat gcg ccc acc gcc acc      1159
Gln Gly Leu Leu Ala Arg Asp Ser Ala Asp Asp Ala Pro Thr Ala Thr
        40                  45                  50

acc gac act gcg gtg cag cgg cat ctc tac gac gcc cag caa ggc act      1207
Thr Asp Thr Ala Val Gln Arg His Leu Tyr Asp Ala Gln Gln Gly Thr  .
    55                  60                  65

gcc ctg cct ggc gtg ctg gtg cgc gag gaa ggc gcg ccg ccc acc gac      1255
Ala Leu Pro Gly Val Leu Val Arg Glu Glu Gly Ala Pro Pro Thr Asp
70                  75                  80                  85

gat gtc gcc gtg acc gag gct tac gat tac ctc ggc gcc acc cat gcc      1303
Asp Val Ala Val Thr Glu Ala Tyr Asp Tyr Leu Gly Ala Thr His Ala
                90                  95                  100

ttc ttc cag cag gtg tat gcg cgc aac tcg atc gac gat gcc ggc atg      1351
Phe Phe Gln Gln Val Tyr Ala Arg Asn Ser Ile Asp Asp Ala Gly Met
        105                 110                 115

ccg ctg ctt ggt acc gtg cac tac gag cgc aac tac gac aac gcg ttc      1399
Pro Leu Leu Gly Thr Val His Tyr Glu Arg Asn Tyr Asp Asn Ala Phe
        120                 125                 130

tgg acc ggc gag cag atg gtg ttc ggc gat ggc gac ggc gag atc ttc      1447
Trp Thr Gly Glu Gln Met Val Phe Gly Asp Gly Asp Gly Glu Ile Phe
        135                 140                 145

acc cgc ttc acc atc gcc atc gac gtg gtg gcc cac gag ctc acc cac      1495
Thr Arg Phe Thr Ile Ala Ile Asp Val Val Ala His Glu Leu Thr His
150                 155                 160                 165

ggt gtc atc gag cgc acc gcc aac ctg atc tac cag ggc cag tcc ggt      1543
Gly Val Ile Glu Arg Thr Ala Asn Leu Ile Tyr Gln Gly Gln Ser Gly
                170                 175                 180

gcc ttg aac gaa tcg gtc tcc gac gtg ttc ggc gtg ctc gtc aag caa      1591
Ala Leu Asn Glu Ser Val Ser Asp Val Phe Gly Val Leu Val Lys Gln
                185                 190                 195

tac gcg ctg cgc cag gac gcc gcg cag gcc gat tgg ctg gtg ggt gcc      1639
Tyr Ala Leu Arg Gln Asp Ala Ala Gln Ala Asp Trp Leu Val Gly Ala
        200                 205                 210

ggc atg ttc ctg ccc ggc gtg cag ggc gtg gcg cta cgc tcg atg cag      1687
Gly Met Phe Leu Pro Gly Val Gln Gly Val Ala Leu Arg Ser Met Gln
        215                 220                 225

gcg ccg ggc acc gcc tac gat gac ccg gca ttg ggc aag gac ccg caa      1735
Ala Pro Gly Thr Ala Tyr Asp Asp Pro Ala Leu Gly Lys Asp Pro Gln
230                 235                 240                 245

ccg gcg cat atg gac gcc tac gtg gac acg caa gaa gac gac ggc ggc      1783
Pro Ala His Met Asp Ala Tyr Val Asp Thr Gln Glu Asp Asp Gly Gly
                250                 255                 260
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gtg cac tac aac tcc ggt att ccc aac cgc gcc ttc cag cgc gcc gcg   1831
Val His Tyr Asn Ser Gly Ile Pro Asn Arg Ala Phe Gln Arg Ala Ala
                265             270             275

gtt gcc atc ggc ggt tac gcc tgg gaa aag gcc ggg cgc atc tgg tac   1879
Val Ala Ile Gly Gly Tyr Ala Trp Glu Lys Ala Gly Arg Ile Trp Tyr
        280             285             290

cgc gcc ctc acc ggt ggc gcg ctg tcg gcc agt gcg gac ttc gcc acc   1927
Arg Ala Leu Thr Gly Gly Ala Leu Ser Ala Ser Ala Asp Phe Ala Thr
        295             300             305

ttc gcc gca ctc acc gtg cgc gtg gcc agc acc gat tac ggc gcg ggc   1975
Phe Ala Ala Leu Thr Val Arg Val Ala Ser Thr Asp Tyr Gly Ala Gly
310             315             320             325

agt gcc gag gcc agt gcg gtg gaa cag gcc tgg cgc gac gtg ggc gtg   2023
Ser Ala Glu Ala Ser Ala Val Glu Gln Ala Trp Arg Asp Val Gly Val
                330             335             340

ctc gca tga ccgtgcaact gccgcccttg caaccgggtg tcgtgttgcg            2072
Leu Ala

gttggcacgc gaaggtggcg tggccgcgtt cccggccatg cgccgcgagc gccagctgct   2132

gctggaagag ctggacgagg tgcaacgcca acacctgggc gcgctgctgg atcagtgcct   2192

ggcgcatgca ctccccgccc cgcaagccgg cggcggcgac cgccgctact tcagcatcat   2252

ctgggatggc gccagcgaac cgctgcgcat ccccgaagaa cacgccccgg cggaaatcgt   2312

acggctgtgg aagcagggca cgttgtagat ggcttgcgcg cgagcgcggc acgcggagac   2372

gcaaagacgc cggtcaacgt tgcgcgcgat cgacgcctcg taggagcaga gcttggtcag   2432

gctcaccacc tcccgggtgg tttcgacttc caagcgcaca cttttgtact gggcatccac   2492

cctggaagtg ggactcaaga aaacattttg tccgtagcac tggcgctctt tgatcgcacc   2552

aaatgcaccc ttgatcgaat ccatcatgat tgatgacccc atgcccccgc tgcggggacg   2612

ccttgcctgg aaatttggtc ttatggcgtt cctttctagc ccagactggg ggagggtt     2670


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50

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cgaaaaatgc tgcacagcat gctgcagcac accggccacc gatgcgcgcg cgggcagggc    120

cgccggtgcc tggcccagcg cccgccaggc cgcgcgcagc gctggcagcg ggtcgctgtc    180

atccactggt tgcgccgcat gcgacttgga aagcttgcgc ccgtcggcgc ccaggatcag    240

cggcagatgc agatagcgcg gcggtgccac gcccagggcc tgctgcagca ccaattggcg    300

cggggtggag tcgagcaggt ccgccccgcg caccacatcg gtgatgccct cgccgcatc    360

gtcgaccacc accgccagct ggtaggccca gtagccgtcg gcacggcgca gcacgacatc    420

gcccacctcg gcgtacacat cctgggtgat gcgcccctgc agcgcgtcct ggaagcttgc    480

ctgggtgttc ggcggcaccc gcaggcgcac ggcccggcgg atgcccagtg gcgccacgca    540

gacgtggtgg atgccaccca tcacggccag ctctgcgcgg ctgcaactgc attcgaacgc    600

cgcaccggtg cgcagcagcc gcgacagtgc cgcctcgtaa tgcgcatcac ggtcggactg    660

atatagcact ggcccgtcag ggtgcagccc gaacgcagcc agcgtatgca attgacgctc    720

tgaggcgcct ggctcggcac gcggcgggtc gatgtcttcg attcgcacat gccattcgcc    780

accggcatgg cgcgcgagca gccagctgcc caacgcagcc aggagcgagc cgaagtgcag    840

ggggccggtg ggcgagggcg cgaagcggcc gcggtaaggg agtgaggaca tgggcagctg    900

aatcgtcggt caggtgcttg cttgatttca acccgccacg tccgcagatc cgcagcagtt    960

catcctcttt gcgtgcggag ccactgcctc tatgttcaac cgt gtc gtc ctg ttt   1015
                                              Arg Val Val Leu Phe
                                              1               5

ctc ttg acc aac ttt gcg gtg ctg atc ctg gcc ggc att gtg atg tcg   1063
Leu Leu Thr Asn Phe Ala Val Leu Ile Leu Ala Gly Ile Val Met Ser
              10              15              20

gtg ctg ggc gtc aat ccg gca cag atg agt ggg ctg ctg gtg atg gcc   1111
Val Leu Gly Val Asn Pro Ala Gln Met Ser Gly Leu Leu Val Met Ala
          25              30              35

gcc atc ttc ggc ttc ggc ggc tcg ttc att tcg ttg ctg ctg tcc aag   1159
Ala Ile Phe Gly Phe Gly Gly Ser Phe Ile Ser Leu Leu Leu Ser Lys
      40              45              50

ttc atg gcc aag cgc agc acc ggt gcg cag gtg atc acc gag ccg cgg   1207
Phe Met Ala Lys Arg Ser Thr Gly Ala Gln Val Ile Thr Glu Pro Arg
  55              60              65

acg cag acc gag cgc tgg ttg gtg gac acg gtg cgc cgc cag gcc cag   1255
Thr Gln Thr Glu Arg Trp Leu Val Asp Thr Val Arg Arg Gln Ala Gln
70              75              80                      85

gcg gcc ggt atc ggc atg ccg gaa gtg gcc atc tac gac gga ccg gaa   1303
Ala Ala Gly Ile Gly Met Pro Glu Val Ala Ile Tyr Asp Gly Pro Glu
```

51

```
atc aac gcc ttc gcc acc ggt gcc aac cgc aac aat gcg ctg gtg gcg    1351
Ile Asn Ala Phe Ala Thr Gly Ala Asn Arg Asn Asn Ala Leu Val Ala
            105                 110                 115

gtt tcc acg ggc ttg ctg cag cac atg cgc gaa gac gag gcc gag gcc    1399
Val Ser Thr Gly Leu Leu Gln His Met Arg Glu Asp Glu Ala Glu Ala
            120                 125                 130

gtg ctg ggc cac gag att gcc cac att gcc aat ggc gac atg gtc acc    1447
Val Leu Gly His Glu Ile Ala His Ile Ala Asn Gly Asp Met Val Thr
            135                 140                 145

atg gcc ttg ctg cag ggc gtg ctg aac acc ttc gtg atc gtg ctg gcg    1495
Met Ala Leu Leu Gln Gly Val Leu Asn Thr Phe Val Ile Val Leu Ala
150                 155                 160                 165

cgc gtg gtg ggc ggc atc atc gac agc gcg ctg tct ggc aat cgc gac    1543
Arg Val Val Gly Gly Ile Ile Asp Ser Ala Leu Ser Gly Asn Arg Asp
                170                 175                 180

agc ggg cgt gga ttt gcc tac tac atc att gtg ttc gtg ctg gag atg    1591
Ser Gly Arg Gly Phe Ala Tyr Tyr Ile Ile Val Phe Val Leu Glu Met
                185                 190                 195

gtg ttc ggc ctg ttc gcc acg atg atc gcg atg tgg ttc tcg cgc cgc    1639
Val Phe Gly Leu Phe Ala Thr Met Ile Ala Met Trp Phe Ser Arg Arg
                200                 205                 210

cgc gag ttc cgt gcc gat gcc ggt ggc gcg cag ctg gcc ggg cgc aac    1687
Arg Glu Phe Arg Ala Asp Ala Gly Gly Ala Gln Leu Ala Gly Arg Asn
            215                 220                 225

aag atg atc gcc gca ttg gag cgc cta tcg ctc aat cac ggc cag aac    1735
Lys Met Ile Ala Ala Leu Glu Arg Leu Ser Leu Asn His Gly Gln Asn
230                 235                 240                 245

acc ttg ccc tcg cag gtg cag gcg ttc ggc att tcc ggc ggt gtg ggt    1783
Thr Leu Pro Ser Gln Val Gln Ala Phe Gly Ile Ser Gly Gly Val Gly
                250                 255                 260

gag ggc ttg cgt cgc ctg ttc ctg agc cac ccg ccg ctg acc gag cgc    1831
Glu Gly Leu Arg Arg Leu Phe Leu Ser His Pro Pro Leu Thr Glu Arg
            265                 270                 275

att gcc gcc ttg cgt gcg tcc aac ggt acg gcg atg taa gccagcggtt    1880
Ile Ala Ala Leu Arg Ala Ser Asn Gly Thr Ala Met
            280                 285

tgcctttcaa caaaaaaccc gcgtcatgcg ggttttttgt tgtggcgtgt ttccttgatt    1940

ctcggcagcg caccgtggcg ataaaccgca cacggcgcca gccagcagca tggcgcctta    2000

cgcgggtggc tatggcctca gccgaactcg tagttcatca gcgggccggt gggcgcgacg    2060

aagtcgcctt gcacgtaatc gacccccgca gtgaagaagc tgctcatcga ctgtgcatcg    2120
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gccacgaact cggccaccgt gaggatgccg gtcggctgcg cccgtgaggt gatctcgcgg    2180

atctttcct ggctttcgcg ggcagaggcg atgtcgccgg tgatgctgcg gtcgagcttg    2240

aggaacgcgg gctggaagtg tgcgagcagc tggaacgaat ccagtcccga accgaattgc    2300

tccagccca ccttgcagcc cattgccgag accgaagcca ggaattgctg ggcgttgcgc    2360

aggtgggtga ataccttcga ttccggggtc tgcagccaca accgctctcc tggcacgccg    2420

tagaccgcca gctgttcgcg gatagtgtcg atcatctgtg ggtcggagaa cgaattgggc    2480

ccgatgcgca ccagcaggtg ggtcttgtgc ccggcgcgct ggcgctcgcc cagctggcgg    2540

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gccatgaacg cattcggcga catcatctcg ccattgcgct ccagccgcag gaacgcctga    2660

tacagctcca gcggctcgcc ctgcaggttg agcacgggct ggtaatgcag caggaagccg    2720

tcgccgatca gcgcctcgcg caactgttcc acccagcgct cgatgcgttc ttcctcggcg    2780

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cgcaccgcct cggtgccgcg gttgagcacc                                     2870


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gccaagggcg tggcgccggt gtcgatctgg ttgtccaccg agtacgcacg tgcagccaag     180

ggcggcaccg gcgcggccaa gtgcggcggc aactacgccg cctcgctgct gccgcagcag     240

aaagcctacg cgcagggctg ctcgcaggtg ctgttcctgg acccggtgga aggcaaatac     300

attgaagaac tgggcggcat gaacgtgttc ctggtctaca aggacggcac gctggtgacc     360

ccagagctgt ccggcagcat cctggaaggc atcacccgcg acagcatcct gcagctggcc     420

cgtgaccgcg gcatgcaggt ggtggagcgc aaggtgtcca tcgacgagtg gaaggacggc     480

gtggcctccg gcgagatcag cgaggtgttc gcctgcggca cggcggctgt ggttaccccg     540
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53

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atcggcgagc tgaagggcga tggctttgcg gtcggcgacc tgtctgcacc ggcgggcgag      600

gtgacgatgt cgctgcgcca ggagctgacc gacatccagt acgggcgcgt gccggaccgc      660

cacggttggc tggtgcgtct gtcctaagcc aacacgtcaa gccaaatcag gcccctgcg       720

cgtcagcgca ggggcttttt tttgcgcgca gtgcagcaag tgcgtgtcat ttggtgtcgc      780

cgcatgtcat cgcgagactg aacggtgccg tacggtgtca caaatctgat atttaatttt      840

ttgaaagtgc gaagttctta ttgtccagtt cggttggatt gcggtaggtt cgctgaacgg      900

atcgataaca ggggcgatcc ggggacctcg cgctgacct acggaaggcg cgccggata       960

acaccgctcc ggcggttctc ttgatatgga agggaattcg atg tcg act gcg tct      1015
                                              Met Ser Thr Ala Ser
                                              1               5

ctc cgc aag cgt act ggc tcg ctc acc atc ctg ggc gcg tcc gcc ctg      1063
Leu Arg Lys Arg Thr Gly Ser Leu Thr Ile Leu Gly Ala Ser Ala Leu
            10              15                  20

acc tcg ctg ctg ctc gcg atg ccg gcc ttt gcc ggc gag gtc tac ctg      1111
Thr Ser Leu Leu Leu Ala Met Pro Ala Phe Ala Gly Glu Val Tyr Leu
        25                  30                  35

gat ggc ctg gcc acc gca cag acc cat cag aaa ttc atc gtg acc tac      1159
Asp Gly Leu Ala Thr Ala Gln Thr His Gln Lys Phe Ile Val Thr Tyr
        40                  45                  50

aag gac ggc agc acc gcg ctg gcc agc ccg tcc gcg ttg acc acc tcg      1207
Lys Asp Gly Ser Thr Ala Leu Ala Ser Pro Ser Ala Leu Thr Thr Ser
    55                  60                  65

ctg cgc act gct gcg cgc gcg gtg ccg gcc aaa gcc ggc aag gcg ctg      1255
Leu Arg Thr Ala Ala Arg Ala Val Pro Ala Lys Ala Gly Lys Ala Leu
70                  75                  80                  85

ggc ctg aac tcg gtg cgc cgc ctg gcg ttg ggg ccg gaa ctg gta agg      1303
Gly Leu Asn Ser Val Arg Arg Leu Ala Leu Gly Pro Glu Leu Val Arg
            90                  95                  100

gca gac cgc gcc ctg gac cgc gcc gag gcc gaa acc ctg atg cgg caa      1351
Ala Asp Arg Ala Leu Asp Arg Ala Glu Ala Glu Thr Leu Met Arg Gln
            105                 110                 115

ttg gcc gct gat ccc aac gtg cag agc gtt gaa gtc gac cag atc ctg      1399
Leu Ala Ala Asp Pro Asn Val Gln Ser Val Glu Val Asp Gln Ile Leu
        120                 125                 130

cat gcc acg ctc acc ccc aac gac acc cgg ttg tcc gag cag tgg gcg      1447
His Ala Thr Leu Thr Pro Asn Asp Thr Arg Leu Ser Glu Gln Trp Ala
        135                 140                 145

ttc ggc acc acc aac gcc ggc ctg aac atc cgc ccg gcc tgg gac aag      1495
Phe Gly Thr Thr Asn Ala Gly Leu Asn Ile Arg Pro Ala Trp Asp Lys
150                 155                 160                 165
```

54

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gcc acc ggc agc ggc acg gtc gtg gcg gtg att gat acc ggc atc acc    1543
Ala Thr Gly Ser Gly Thr Val Val Ala Val Ile Asp Thr Gly Ile Thr
                170                 175                 180

agt cat gcc gac ctc aac gcc aac atc ctc gcg ggc tac gac ttc atc    1591
Ser His Ala Asp Leu Asn Ala Asn Ile Leu Ala Gly Tyr Asp Phe Ile
                185                 190                 195

agc gat gcg acc acc gca cgc gat ggc aac ggc cgt gac agc aac gcc    1639
Ser Asp Ala Thr Thr Ala Arg Asp Gly Asn Gly Arg Asp Ser Asn Ala
                200                 205                 210

gcc gac gaa ggc gac tgg tac gcc gcc aac gaa tgc ggc gcc ggc att    1687
Ala Asp Glu Gly Asp Trp Tyr Ala Ala Asn Glu Cys Gly Ala Gly Ile
                215                 220                 225

ccc gcc gcc agc tcc agc tgg cac ggc acc cat gtg gcc ggc acg gtc    1735
Pro Ala Ala Ser Ser Ser Trp His Gly Thr His Val Ala Gly Thr Val
230                 235                 240                 245

gcg gca gtg acc aac aac acc acc ggc gta gcc ggc acc gcc tac ggc    1783
Ala Ala Val Thr Asn Asn Thr Thr Gly Val Ala Gly Thr Ala Tyr Gly
                250                 255                 260

gcc aag gtc gta ccg gtg cgc gtg ctc ggc aag tgc ggt ggg tcg ctg    1831
Ala Lys Val Val Pro Val Arg Val Leu Gly Lys Cys Gly Gly Ser Leu
                265                 270                 275

tcg gat atc gcc gac gcc atc gtc tgg gcc tcc ggc ggc acc gtc agc    1879
Ser Asp Ile Ala Asp Ala Ile Val Trp Ala Ser Gly Gly Thr Val Ser
                280                 285                 290

ggc atc ccg gcc aat gct aac ccg gcc gag gtg atc aac atg tcg ctc    1927
Gly Ile Pro Ala Asn Ala Asn Pro Ala Glu Val Ile Asn Met Ser Leu
                295                 300                 305

ggc ggc ggc ggt agc tgc tcg acc acc atg cag aac gcc atc aac ggt    1975
Gly Gly Gly Gly Ser Cys Ser Thr Thr Met Gln Asn Ala Ile Asn Gly
310                 315                 320                 325

gcg gtg tcg cgc ggc acc acg gtg gtg gtc gcg gcc ggc aac gat gcg    2023
Ala Val Ser Arg Gly Thr Thr Val Val Val Ala Ala Gly Asn Asp Ala
                330                 335                 340

tcc aat gtg tcc ggt tcg ctg ccg gcc aac tgc gcg aac gtg att gcg    2071
Ser Asn Val Ser Gly Ser Leu Pro Ala Asn Cys Ala Asn Val Ile Ala
                345                 350                 355

gtg gcc gcc acc acc tcg gcg ggc gcg aag gcc agc tat tcc aac ttc    2119
Val Ala Ala Thr Thr Ser Ala Gly Ala Lys Ala Ser Tyr Ser Asn Phe
                360                 365                 370

ggc acc ggt atc gat gtg tcg gcg ccc ggc tcg tcg atc ctg tcc acg    2167
Gly Thr Gly Ile Asp Val Ser Ala Pro Gly Ser Ser Ile Leu Ser Thr
                375                 380                 385
```

```
ctc aac agc ggc acc acc acg ccg ggt agc gcc agc tat gcc tcc tac    2215
Leu Asn Ser Gly Thr Thr Thr Pro Gly Ser Ala Ser Tyr Ala Ser Tyr
390             395             400             405

aac ggc acc tcg atg gcg tcg ccg cat gtg gcc ggc gtg gtc gcg ctg    2263
Asn Gly Thr Ser Met Ala Ser Pro His Val Ala Gly Val Val Ala Leu
            410             415             420

gtg cag tcg gtc gcc ccg acc gcg ctg acg cca gca gcg gtg gaa acc    2311
Val Gln Ser Val Ala Pro Thr Ala Leu Thr Pro Ala Ala Val Glu Thr
        425             430             435

ttg ttg aag aac acc gcg cgt gct tta ccg ggc gcc tgc tcg ggc ggc    2359
Leu Leu Lys Asn Thr Ala Arg Ala Leu Pro Gly Ala Cys Ser Gly Gly
        440             445             450

tgc ggt gcc ggc atc gtc aac gcc gat gcc gcg gtc act gcg gcc atc    2407
Cys Gly Ala Gly Ile Val Asn Ala Asp Ala Ala Val Thr Ala Ala Ile
    455             460             465

aat ggc ggg agc ggc ggc ggt ggc ggt ggt gga aac acc ttg acc aac    2455
Asn Gly Gly Ser Gly Gly Gly Gly Gly Gly Asn Thr Leu Thr Asn
470             475             480             485

ggc act ccg gtg acc ggc ctg ggc gcg gcg act ggc gcg gaa ttg aac    2503
Gly Thr Pro Val Thr Gly Leu Gly Ala Ala Thr Gly Ala Glu Leu Asn
            490             495             500

tac acc atc acc gtg ccg gcc ggc agc ggc acc ttg acg gtg acc acc    2551
Tyr Thr Ile Thr Val Pro Ala Gly Ser Gly Thr Leu Thr Val Thr Thr
            505             510             515

agc ggc ggc agc ggc gat gcc gac ctg tat gtg cgc gcc ggc agt gca    2599
Ser Gly Gly Ser Gly Asp Ala Asp Leu Tyr Val Arg Ala Gly Ser Ala
        520             525             530

ccg acc gac tcg gct tac acc tgc cgc cca tac cgc agc ggc aat gcc    2647
Pro Thr Asp Ser Ala Tyr Thr Cys Arg Pro Tyr Arg Ser Gly Asn Ala
    535             540             545

gag acc tgc acc atc acc gca ccg tcc gga acg tat tac gtg cgt ctg    2695
Glu Thr Cys Thr Ile Thr Ala Pro Ser Gly Thr Tyr Tyr Val Arg Leu
550             555             560             565

aag gcc tac agc acg ttc tcc ggc gtc acc ctg cgc gcc agc tac taa    2743
Lys Ala Tyr Ser Thr Phe Ser Gly Val Thr Leu Arg Ala Ser Tyr
            570             575             580

ccgcgcgtca cgcgcgcccc ggcactgcgc cagggcgcgc tcctcatctg caatccactc    2803

cacgcctgcc gattcggcag cgcctgggaa tgtgttgccg cgtggccggg acggacaccg    2863

gtcagtcgtt tcgacaggca cctgcctgtg cacttccaga cctgccatcg cagcgcgcga    2923

tggggtccgg ccatcacgcc gcatctgcgg cacctcatca ctgaaaggaa cgatcgatgt    2983

ccaatgtgtc gcaacgtcgt gcgcctacgc gcgcgctggt agtcctgggt gtgtccgcgc    3043
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56

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tgacctcgct gctggcggtg ccggccttcg ccgggcaggt gaatctgtcc gggctggatt   3103

cgcagccgac gctggatcgc ttcatcgtca aataccgcga cggcagcagt gcgtcggtga   3163

gcccgacctc gatgcgcgcc tcgctcaatt cggtggccac tgcggtgccg gcacgcgccg   3223

gccgcgcgct gggcctgaac cacgtgcgtc gcaccgcgct gggctccgaa gtgctcaaga   3283

ccgaccgcag tctggaccgc gccgaagccg agacgctgat gcgccgcaca tcgccgccga   3343

cccgagcgtg gaatacgtgg aaatcgatca gatcatgtac ccgacgctga ccccgaacga   3403

cacgcgtctg tccgagcagt ggggcttcgg caccaccgca tcgggcatca acgtgcgccc   3463

ggcctgggac accgccaccg gcaccggcgt ggtggtcgcg gtgatcgaca ccggcatcac   3523

cagccatccg gacctcaacg ccaacgtgct gcccggctac gacttcatca gcgatgcggc   3583

gcgtgcgcgc gacaacaacg gccgtgacag caacgcggcc gaccagggcg actggcgcac   3643

ggccaaccag tgcggtaccg gcgtggcagc ggccaattcc agctggcatg gcacgcacgt   3703

ggccggcacg attgccgcgg tcaccaacaa cagcaccggc              3743
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<222>   (1001)..(2452)

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cgagcttctc caacttcggc accaccatcg atatctccgg tccgggctcg gcgatcctgt   180

ccacgctcaa cagcggcacc accaccccgg gcagcgccag ctacgcgtcc tacaatggca   240

cctcgatggc ggcgccgcac gtggccggcg tggtcgcgct ggtgcagtcg gcagcgtcgc   300

gtccgttgac cccggcggcg gtggaaacgc tgttgaagaa caccgcccgg ccgttgccgg   360

gcgcctgctc gggcggttgc ggtgccggca tcgtcaacgc agccggcgcg gtcagccaga   420

cgccgtaacg cgacgccgta acgcgtattt ccccagcgca cagtgccggc gtctgtcaga   480

gcgctcccga cgcggctgtc ggtgcctgtc tctctctctt gtgccccgcc caggcggggc   540

ttttttgtgc gcgcgctgca tgggccggga cgtgcgccag gggtagctga acgaacgcaa   600
```

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gtgggcggat gctgcctggc ttcagcgcca ttcgggttcg ccgatagcct cgtcacgtgg    660

gggctgcgtc atgcaatgcc cgcgcatccg acgcggcgtt gcagtccctg cgctgcgcgt    720

catccgagta ccgatatcct ggggagggcg attcatgagg cagtcaacgg ttggcgcagt    780

gcgctacgcg gcgtgtgtgt gtgcgatggc gtgtgtgttt caggtatcgg ccggcgaggt    840

caacctgcag ggcctggcat cgggctcgag ccaccagcgt ttcatcgtca gctacaagga    900

ccgcgtaggc agcacccgcg cgaccgggct gtcggctccg tggggcgaga tcgcccgcgc    960

cgtccctagg cggcaagggc gcgcgctggg cttgtcggcc atg cgt cgg ctc agt    1015
                                              Met Arg Arg Leu Ser
                                              1               5

gcc ggc ccg atg ctg ctg gtg gcc gat cgg cgc ctg gac cgg gtc gac    1063
Ala Gly Pro Met Leu Leu Val Ala Asp Arg Arg Leu Asp Arg Val Asp
            10              15              20

tcg gaa agc ctg atg cgc cgg ctt gcc gcc gac ccg acc gtc aag cgg    1111
Ser Glu Ser Leu Met Arg Arg Leu Ala Ala Asp Pro Thr Val Lys Arg
        25              30              35

gtg gaa gtg gac gtg ctg atg cgg ccg ctg ctg gcg ccc aac gac ccc    1159
Val Glu Val Asp Val Leu Met Arg Pro Leu Leu Ala Pro Asn Asp Pro
        40              45              50

ggc ctg cca cag cag tgg gcg atg gga acc acc acc gcc agc ctc aat    1207
Gly Leu Pro Gln Gln Trp Ala Met Gly Thr Thr Thr Ala Ser Leu Asn
    55              60              65

gtc cgc ccg gcc tgg gac cgc acc acc ggc aag ggc atc gtg gtg gcg    1255
Val Arg Pro Ala Trp Asp Arg Thr Thr Gly Lys Gly Ile Val Val Ala
70              75              80              85

gtg atc gat acc ggc atc acc gcg cat ccg gac ctg gcc gcc aac gtg    1303
Val Ile Asp Thr Gly Ile Thr Ala His Pro Asp Leu Ala Ala Asn Val
            90              95              100

ttg ccc ggc tac gac ttc atc acc gac ccc acc gtc gca ggc gac ggc    1351
Leu Pro Gly Tyr Asp Phe Ile Thr Asp Pro Thr Val Ala Gly Asp Gly
            105             110             115

aac ggg cgt gac aac aat gcc gcc gat cag ggc gat tgg tcc gcg gcc    1399
Asn Gly Arg Asp Asn Asn Ala Ala Asp Gln Gly Asp Trp Ser Ala Ala
        120             125             130

aac gct tgc ggt gcg ggc gcg tcg gcg tcc aat tcc agc tgg cat ggc    1447
Asn Ala Cys Gly Ala Gly Ala Ser Ala Ser Asn Ser Ser Trp His Gly
    135             140             145

acc cat gtc gcc ggc atc gtt gcc gca gtt ggc aac aac gcg gcc ggg    1495
Thr His Val Ala Gly Ile Val Ala Ala Val Gly Asn Asn Ala Ala Gly
150             155             160             165

gtg gtc ggc act gcc ttc aac gcc aaa ctg ttg ccg ttg cgc gtg ctc    1543
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58

```
Val Val Gly Thr Ala Phe Asn Ala Lys Leu Leu Pro Leu Arg Val Leu
            170             175             180

ggc aaa tgc ggt ggc tac atg tcc gat atc gcc gat gcc atc gtg tgg    1591
Gly Lys Cys Gly Gly Tyr Met Ser Asp Ile Ala Asp Ala Ile Val Trp
            185             190             195

gca tct ggc ggc aag gtg acc ggc gtg ccg gcc aat ccg aat ccc gcc    1639
Ala Ser Gly Gly Lys Val Thr Gly Val Pro Ala Asn Pro Asn Pro Ala
            200             205             210

acg gtg atc aac ttg tcg ctc ggc ggc tat ggc agc tgc tcg acg atc    1687
Thr Val Ile Asn Leu Ser Leu Gly Gly Tyr Gly Ser Cys Ser Thr Ile
            215             220             225

atc ggc aat gcc atc acc ggc gcg gtc acg cgc ggc acc gcc gtg gta    1735
Ile Gly Asn Ala Ile Thr Gly Ala Val Thr Arg Gly Thr Ala Val Val
230             235             240             245

gtg gcg gcc ggc aac agc aat atg gat gtg gcc acc agc atg ccg gcc    1783
Val Ala Ala Gly Asn Ser Asn Met Asp Val Ala Thr Ser Met Pro Ala
            250             255             260

aat tgc gcg aac gtg att gcg gtg gcg gca acc acc tcg gcc ggc gcc    1831
Asn Cys Ala Asn Val Ile Ala Val Ala Ala Thr Thr Ser Ala Gly Ala
            265             270             275

aag gcc agc ttc tcc aac ttc ggc aag ggc gtg gac atc gcc gcg ccc    1879
Lys Ala Ser Phe Ser Asn Phe Gly Lys Gly Val Asp Ile Ala Ala Pro
            280             285             290

ggc cag gcg atc att tcc acg ctc aat agc ggc acc acg gtt cca gcc    1927
Gly Gln Ala Ile Ile Ser Thr Leu Asn Ser Gly Thr Thr Val Pro Ala
            295             300             305

aat ccg gcc tac gcg gtg tat agc ggc acc tcg atg gcg gcg ccg cat    1975
Asn Pro Ala Tyr Ala Val Tyr Ser Gly Thr Ser Met Ala Ala Pro His
310             315             320             325

gtg gcc ggc gtg gtg gcg ttg atg cag tcg gtg gca ctt aac ccg ctg    2023
Val Ala Gly Val Val Ala Leu Met Gln Ser Val Ala Leu Asn Pro Leu
            330             335             340

acg ccg gca acg gtg gag gcg ctg ctg aag agc agt gca cgc ccg ttg    2071
Thr Pro Ala Thr Val Glu Ala Leu Leu Lys Ser Ser Ala Arg Pro Leu
            345             350             355

ccg gtg gcg tgc gct ccc ggc tgc ggt gcg ggc ctg gtc aat gcc gat    2119
Pro Val Ala Cys Ala Pro Gly Cys Gly Ala Gly Leu Val Asn Ala Asp
            360             365             370

ggc gcg gtg gcg gcg gtg atc aat gcc acg ctg ctg acc agt aat gca    2167
Gly Ala Val Ala Ala Val Ile Asn Ala Thr Leu Leu Thr Ser Asn Ala
            375             380             385

gta cgc act ggc ctg agc gcg gcg atc ggc gat tcg ctg tat tac cag    2215
Val Arg Thr Gly Leu Ser Ala Ala Ile Gly Asp Ser Leu Tyr Tyr Gln
```

59

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gtc aag gtg ccg gca ggc acg cgc tcg ctc aag gtc acg ctc agc ggc    2263
Val Lys Val Pro Ala Gly Thr Arg Ser Leu Lys Val Thr Leu Ser Gly
            410                    415                    420

ggc agc ggc aat gcc gac ctg tca ctg cgc gcc aat gca ctg ccc acc    2311
Gly Ser Gly Asn Ala Asp Leu Ser Leu Arg Ala Asn Ala Leu Pro Thr
            425                    430                    435

gac gct gcc ttt ggc tgc cgc agc atg ctg gtc ggc aac acc gaa gcc    2359
Asp Ala Ala Phe Gly Cys Arg Ser Met Leu Val Gly Asn Thr Glu Ala
            440                    445                    450

tgc aca ctg acc gca cct gcg gca ggc acg tat tac gtg cga ctg aaa    2407
Cys Thr Leu Thr Ala Pro Ala Ala Gly Thr Tyr Tyr Val Arg Leu Lys
    455                    460                    465

gga acg ctg gcg ttc tcc gcg gtc aac ctg gtg gcg acg tac tga        2452
Gly Thr Leu Ala Phe Ser Ala Val Asn Leu Val Ala Thr Tyr
470                    475                    480

tagcagggca gccgcctggc cgtgcgaggc agtgacgcgc tggtgcctga ggcaaggcgc    2512

cagcgcgttt ctatgtatgg cggacgcaag gctggcttac ctgcgctatt tcgggcgtgg    2572

caggctcact cgcagagcgg gtaagcgcgc gcgccgagga catgcacaat ctcggcgccg    2632

gccagttcca gcagcaggcc acgctggccg gcgttgatcc acaacgcagg tgcgtcgagc    2692

acgctggatt cgatcagcac cggcgtgggc cgctgctgcc cgagcgggct gatgccgccc    2752

accttgtagc cggtgcggcg ttcggcatcg gccacctcca tcatgcgcgc ggacttgccg    2812

ccgcaggcgc tggcaagggt cttcaacgac aagcggcggt cgcacgggat caccacgcag    2872

atcgcgtgct cgtccaccca ggtcatcagg gtcttgagca cctggtgcgg cggcagttgc    2932

agcgcctgcg cagcttgcag gcccttggcg tcggcatcgg cctggtactg ataaggatgc    2992

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gcttagaccg gttcgaaccg gttggccgcc acgttcttgc gcaccgtttc cgggttccag    3112

atccttccgt tcatggcgat gtagacgccg gccggcagcg tctggacggc cccgaccgcg    3172

cagccgatgt tgaactcggc atcggagccg cgaaagcgcg ccggattgag tgcgccggtc    3232

atcacgatgg tcttgtcggc gatcgactgc agcaccttgc cggtttccac catcgaatcg    3292

gtgccgtggg tgatcagcac ctgtcgggcg ggctgcgcct ggatggtggc gcggatcagc    3352

tcgcggtctt cctgggtgat gtgcaacgaa tccttgcgga tgatcgggat gaccgtgaag    3412

cggaaggtca cgcccagttc cttgaggatc tggccgatct                         3452
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cgaggacctg cgcgccggcc gcctggtcga agtgatgccc gactacccgc cgcccacctc    60

gcagatcagc gcggtcatgc cggcgcggca attgcagccg ccccgcgtgc gtgcgtttgt   120

ggactttctg ctcgaacact cggcgagac gccaccctgg gaactgccta gtgctgcaag    180

aggtggtgag tgacgccacc gcagcgtgcc atcagtatcc tgggttcaga gcacgcttca   240

gcctacgtcg gccgctgaat aacttcgcgt tgcgattgat tgtttggatc gatcacgtca   300

aaaaaatccc aatcgcaagc acatgctgtg ccgttatccg cagcagttgc gcatagaact   360

acatgtcact gcaaaaatcg ctgctgcatc acagccggcg ccgcgttctg cgatttgtcg   420

tgctgcatcg ctgcagttac atctgtgccc agtcgcttgc agatcacgcg accgcgccga   480

gccgagcatt cccaatgctc gccggctgca caggatcgcc tgcgtcgttg catgacccgg   540

gcgcatggat agataccgac cggactcgat gaagatggat atgccttcgc tcctgatgta   600

cccgtacgtg ccacgccggc cccgcgatat tgcgtggtcc gctgccgccg ttccactgcg   660

atatcgcaca caacatctgc gctgatagcc cgcattaacc gcccgagtac tccccgctcg   720

gcgcacgacg cacgacgccc ttgatgcatc acacacgacc atagcggccg tgtacgcacg   780

acgcatgcgc gccattgcga gcgcctgcat gcgctacgcc gtcgattacg gcaaatctcc   840

cgctcgcacc caaatgggac tctgttgatg acttctttc cgcaacggca attgctgttc    900

tccgcgctcg tgctggcgct gtgtagcgcg gcatcctcgg caccgggtgt ggcgcaaac    960
```

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cccggcaaca tcacgcgccc aacccaggcc accagaagaa agt gac ccg ctt ttc   1015
                                              Ser Asp Pro Leu Phe
                                              1               5

cgc tat caa tgg cat ttg ctc aac gat ggg caa gag gtc att gcc gac   1063
Arg Tyr Gln Trp His Leu Leu Asn Asp Gly Gln Glu Val Ile Ala Asp
                10                  15                  20

act cgg cca cgc gcc gga acg gat ctg aat gtg ggc ccg ctg cat acg   1111
Thr Arg Pro Arg Ala Gly Thr Asp Leu Asn Val Gly Pro Leu His Thr
            25                  30                  35

ttg ggg ctg cgt gga caa ggc gta acc gtc gcc gtc gtg gac gac gca   1159
Leu Gly Leu Arg Gly Gln Gly Val Thr Val Ala Val Val Asp Asp Ala
```

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ctc gaa cta cgc cac ccg gat ctt gtt gcc aac gtg gtg ccc ggc ggt    1207
Leu Glu Leu Arg His Pro Asp Leu Val Ala Asn Val Val Pro Gly Gly
    55              60                  65

tcc aag aac ttt gtc gat gga tcg aat gat cca acg cca cgc aac ggc    1255
Ser Lys Asn Phe Val Asp Gly Ser Asn Asp Pro Thr Pro Arg Asn Gly
70              75                  80                  85

gct tcc cac ggc acg atg gtt ggc ggg atc atg gcg gca gtg ggc tgg    1303
Ala Ser His Gly Thr Met Val Gly Gly Ile Met Ala Ala Val Gly Trp
                90                  95                  100

aac ggg ctt ggt ggt cgc ggc gtt gcg ccc gat gcg cgc ctg aaa ggt    1351
Asn Gly Leu Gly Gly Arg Gly Val Ala Pro Asp Ala Arg Leu Lys Gly
            105                 110                 115

ttc aac atc ctt tcc tca gaa gaa agc ccg acc gac ttc gat acc aat    1399
Phe Asn Ile Leu Ser Ser Glu Glu Ser Pro Thr Asp Phe Asp Thr Asn
            120                 125                 130

cta cgc gcc tcc tgg ggc gat tcg gtg caa tcc cgg gat gtg gat gta    1447
Leu Arg Ala Ser Trp Gly Asp Ser Val Gln Ser Arg Asp Val Asp Val
    135                 140                 145

ttc aat aac agc ttt ggc tca gat ctg acg tac tac ccg aca atc tct    1495
Phe Asn Asn Ser Phe Gly Ser Asp Leu Thr Tyr Tyr Pro Thr Ile Ser
150                 155                 160                 165

cca gca gca gag cgc tcg ctt gac cgc ttg atg cgt cga gca aga aac    1543
Pro Ala Ala Glu Arg Ser Leu Asp Arg Leu Met Arg Arg Ala Arg Asn
                170                 175                 180

ggc aag ggg ggt ctg tat gtc cag gca gca ggg aac acg ttc gat agt    1591
Gly Lys Gly Gly Leu Tyr Val Gln Ala Ala Gly Asn Thr Phe Asp Ser
            185                 190                 195

ttt acg gtt ctc gac gac cag ggg aac tgg gtg gag cga tgc cct gtg    1639
Phe Thr Val Leu Asp Asp Gln Gly Asn Trp Val Glu Arg Cys Pro Val
    200                 205                 210

ctg gcc cgc acc ttg gga gtc act tgc tcc acg ccg gct acc gat ccg    1687
Leu Ala Arg Thr Leu Gly Val Thr Cys Ser Thr Pro Ala Thr Asp Pro
    215                 220                 225

ttg agt aac caa ccc ctg atc atc gcg acg ggc gca gtc aat gca cgc    1735
Leu Ser Asn Gln Pro Leu Ile Ile Ala Thr Gly Ala Val Asn Ala Arg
230                 235                 240                 245

ggc ctg cgc tcg tcc tac tct tca gcc ggc gcg gcg cta tgg gtc acc    1783
Gly Leu Arg Ser Ser Tyr Ser Ser Ala Gly Ala Ala Leu Trp Val Thr
            250                 255                 260

ggc ttc ggc ggg gag ttc ggg ctg caa cgc cgc tac ttt ggc gac cgg    1831
Gly Phe Gly Gly Glu Phe Gly Leu Gln Arg Arg Tyr Phe Gly Asp Arg
            265                 270                 275
```

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ccg cgg ccc gcg ttg ttc gat ccc gcc atc gtc acc acc gac ctg act      1879
Pro Arg Pro Ala Leu Phe Asp Pro Ala Ile Val Thr Thr Asp Leu Thr
        280                 285                 290

ggc tgc gcc gtc ggt gac aac agg gac atc gcc ggc cag ccg ccg atc      1927
Gly Cys Ala Val Gly Asp Asn Arg Asp Ile Ala Gly Gln Pro Pro Ile
        295                 300                 305

aat gca ttg gct tca agc agc tca ccg atc gac gcc tct tgc aac tac      1975
Asn Ala Leu Ala Ser Ser Ser Ser Pro Ile Asp Ala Ser Cys Asn Tyr
310                 315                 320                 325

tcc gcg gca atg aac ggc acc tcc gca gcg gca ccc acg gtt gct ggg      2023
Ser Ala Ala Met Asn Gly Thr Ser Ala Ala Ala Pro Thr Val Ala Gly
                330                 335                 340

gtg gtt gcg ctg atc gtg cag gcc aat ccg tcg ctc acc gcg cgc gac      2071
Val Val Ala Leu Ile Val Gln Ala Asn Pro Ser Leu Thr Ala Arg Asp
                345                 350                 355

ctt aag tac atc ctg gca aca agc gcg cgc cag atc gat cct gcg cag      2119
Leu Lys Tyr Ile Leu Ala Thr Ser Ala Arg Gln Ile Asp Pro Ala Gln
        360                 365                 370

cag gtg atc cgc tac caa ggc agc gtg atc gag ccg ggc tgg atc acc      2167
Gln Val Ile Arg Tyr Gln Gly Ser Val Ile Glu Pro Gly Trp Ile Thr
        375                 380                 385

aat gcg gcc ggc cat gca ttt agc aac tgg tac ggt ttc ggc ctg gtg      2215
Asn Ala Ala Gly His Ala Phe Ser Asn Trp Tyr Gly Phe Gly Leu Val
390                 395                 400                 405

gac gct gcc gaa gcg gtc tat cgc gcc tat ggg ttc cag ccg ctt ccg      2263
Asp Ala Ala Glu Ala Val Tyr Arg Ala Tyr Gly Phe Gln Pro Leu Pro
                410                 415                 420

ccc cag cgc gat ctg ggc tgg aaa gcg gca cgc gca ggc aca tcg acg      2311
Pro Gln Arg Asp Leu Gly Trp Lys Ala Ala Arg Ala Gly Thr Ser Thr
                425                 430                 435

att ggc gga cca aat gcc gcg gca acc ttg cgg ttg cgg ctc ggg gac      2359
Ile Gly Gly Pro Asn Ala Ala Ala Thr Leu Arg Leu Arg Leu Gly Asp
                440                 445                 450

acg ctc aag atc gac acc gtg cag tgg tcg atg cag acc acc cac aag      2407
Thr Leu Lys Ile Asp Thr Val Gln Trp Ser Met Gln Thr Thr His Lys
        455                 460                 465

aca ccg agc aat ctc cgg gta gtg ctg atc tcg ccg agt ggc acc cgc      2455
Thr Pro Ser Asn Leu Arg Val Val Leu Ile Ser Pro Ser Gly Thr Arg
470                 475                 480                 485

agc tac gtg ctc act ccc ttc cag gcc ttg gat acg atc acg cag ggg      2503
Ser Tyr Val Leu Thr Pro Phe Gln Ala Leu Asp Thr Ile Thr Gln Gly
                490                 495                 500
```

```
gcc ggc ttt gag ata ccg ctt tcg acc agc aat gcc ttc cta gac gaa      2551
Ala Gly Phe Glu Ile Pro Leu Ser Thr Ser Asn Ala Phe Leu Asp Glu
            505             510             515

aac gtt gcc ggc acc tgg acg ctg gaa gtc acc gac atg acc ggc tcg      2599
Asn Val Ala Gly Thr Trp Thr Leu Glu Val Thr Asp Met Thr Gly Ser
            520             525             530

gac gtt ccc gcc caa ctg acg ggc ttc aaa ctg cgc atc ctg gga cat      2647
Asp Val Pro Ala Gln Leu Thr Gly Phe Lys Leu Arg Ile Leu Gly His
    535             540             545

tga catgaacctc gctctcggta cgaccctcat cctttgcgcg cttgccagca           2700

tgccggcctc tgcgcaagac accgaccggc tcgcattgca gcgtgccgca accgggcaag     2760

gcttcaccat cggcgatacc aacttcaggt tggtacccaa cgccagagtg ctacgcaata     2820

caacgccgcc gccccgcgca gatgtgcctg caatgcgccg tagcaccact gccgctgccg     2880

gcgtaacgct gcagcacatt ggcccgtatg tcatctccag cggcaactca ccgcgctcac     2940

cgcgtaccac gcccgtcggc gacgtggagg agccgtcgtt gatggtggca atcaatcagc     3000

gcaacggcca gccagtggtg gcgtcaccac gcctgcaggt gtatgccggc gatgccgatg     3060

ccatcgttcg cttggcgcgg caaaccaatg gtgctgtctt ggcagcatca caggatggca     3120

cgggcgtgat cggctatcgt tcggtcccgg aagcactcgc agcgctacca accgtaaggc     3180

gcggcggcgg cgttgacgac gttgtccttc aggtgatcca ggcagtccca cgcctgcgct     3240

agtgctagcc gccgccaccg tgtggaacga ttcacacggt ggcggtgatg taccgggcac     3300

gactgacgga ggagttaacc ggcccgatca tgcgtcgccc gctgcgatct ccgtgttcgt     3360

ccttcagggg aacacgcgtt tgccgacgat ccagttcact taagcgtact cgtgcggtac     3420

aggcgcttgc gcaacccgcg ccgctgcacc tcgctgagca aatgcccatg agtgtgcaac     3480

aggccaagga tctgctggtg cgccagttgg gtgcgccgtg cgagctcggc cgttgccgcc     3540

agctcgatcg ctttccagtc ggcaggggtt gcgggatctg cggggagtga acgctttgcg     3600

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caatgccggc gacctggcat cgatggtcgc cggcatgtcg cgcgggctgc tggtcaccga     180

gctgatgggc aacggcgtca acgcggtgac cggcgactat tcgcgcggtg ccggcgggtt     240

ctgggtcgag aacggcgaga tcgcctatcc ggtcgacggg ctgaccattg ccggcaacct     300

gcgcgacatg tttgccggga tcgaagcggt gggcagcgat gtcgacccgc gctcgcacgt     360

caagatcggc tcggtgctga tcaatcgcat gaccgtggcc ggcgacagct gagtcacccg     420

cccagtaact gcgcccgcca gcgtcccggc gctggcggac ccatggcttc cgcactggt     480

ggcgcgcgga ttggttgcta tagtccgccg cacaccacaa ccatgcatgg ggagacatga     540

tgagcgagtt cgacacacac gccgcgccac caccgccgcc gatcagcacc ggcacgccct     600

cggaagagcg cacgttggca ctggccgcgc acctgctggg catcctgacg tccttcatcg     660

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                                               Ser Val Leu Arg Arg
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ggt gtt ctc ggc aaa gta ctc gtg gct gtc ggc att ggt gat cgc ctg    1063
Gly Val Leu Gly Lys Val Leu Val Ala Val Gly Ile Gly Asp Arg Leu
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ggc cgg gtt gct gat cgc cag gct gcg tgc gcc gga ctg acc ata cac    1111
Gly Arg Val Ala Asp Arg Gln Ala Ala Cys Ala Gly Leu Thr Ile His
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gcg gtc ctg ggt gcc ggc cac cac ggt gaa gtg gct ggt ctc gtg cac    1159
Ala Val Leu Gly Ala Gly His His Gly Glu Val Ala Gly Leu Val His
            40                  45                  50

cag cgt gcc ggc ctt gga gtc ggt gcc ggt tgt cga cgc gct cca gaa    1207
Gln Arg Ala Gly Leu Gly Val Gly Ala Gly Cys Arg Arg Ala Pro Glu
    55                  60                  65

cgc gtt gca gac atg gat ctc gta cgg ctg gtt cgg ata gac gta agc    1255
Arg Val Ala Asp Met Asp Leu Val Arg Leu Val Arg Ile Asp Val Ser
70                  75                  80                  85
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65

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gaa ggc gtc cgc cag atc cgc ttc gca gct gca gtt gat cgt cag ctg      1303
Glu Gly Val Arg Gln Ile Arg Phe Ala Ala Ala Val Asp Arg Gln Leu
                90              95                  100

gcc att gtt ctg gtc cag cgc gtt gtc gat gtt gac gaa gtt gga gct      1351
Ala Ile Val Leu Val Gln Arg Val Val Asp Val Asp Glu Val Gly Ala
            105                 110                 115

gac ccg gct gta gcg cgc ggc gtt gta ggt gcc gaa cca ggt ggt gta      1399
Asp Pro Ala Val Ala Arg Gly Val Val Gly Ala Glu Pro Gly Gly Val
        120                 125                 130

gcg cgc ccc ggt gct gcc gcc gtt gag gta ggt acg cgc gtt ctg cga      1447
Ala Arg Pro Gly Ala Ala Ala Val Glu Val Gly Thr Arg Val Leu Arg
    135                 140                 145

gta att acg cgc ggc agc gac gcc act ggc ggc ctg gtt ggt gcg ggt      1495
Val Ile Thr Arg Gly Ser Asp Ala Thr Gly Gly Leu Val Gly Ala Gly
150                 155                 160                 165

ggt gct gca gtt gag ata gtt gat gcc gtt gac cac ggc ggt cgg gcc      1543
Gly Ala Ala Val Glu Ile Val Asp Ala Val Asp His Gly Gly Arg Ala
                170                 175                 180

gat tgc gag ctg gcg cta tac acc acg tcg cgc gcc atc cag cca aac      1591
Asp Cys Glu Leu Ala Leu Tyr Thr Thr Ser Arg Ala Ile Gln Pro Asn
            185                 190                 195

agt gag cgg ggt gct ggt ggc cac tgc cgg cag gcc gtt tgc ggc ctt      1639
Ser Glu Arg Gly Ala Gly Gly His Cys Arg Gln Ala Val Cys Gly Leu
            200                 205                 210

cat cgg gct gcc atc gga cag cga ggc gta ctg cag cga cga gcg cac      1687
His Arg Ala Ala Ile Gly Gln Arg Gly Val Leu Gln Arg Arg Ala His
    215                 220                 225

ctg gat ggt gta gtt gcc gct ggt gga cag gtc ata ggc gcc ggc cag      1735
Leu Asp Gly Val Val Ala Ala Gly Gly Gln Val Ile Gly Ala Gly Gln
230                 235                 240                 245

atc cac ctc gcc ctg gac gct ctg gcc cgg ctg cag gat ggt gaa gtc      1783
Ile His Leu Ala Leu Asp Ala Leu Ala Arg Leu Gln Asp Gly Glu Val
                250                 255                 260

ggc tgc ctt ggg cag gcc gcg ctt gac cag gcg ccc ggt gta gtc cac      1831
Gly Cys Leu Gly Gln Ala Ala Leu Asp Gln Ala Pro Gly Val Val His
            265                 270                 275

cgg ctt gcc gtc gcg gct cac ctc cag gat gcc gtt gtc cag cga ctt      1879
Arg Leu Ala Val Ala Ala His Leu Gln Asp Ala Val Val Gln Arg Leu
            280                 285                 290

cag cgg cag ctg ata ggt cgg aac gcg ggc aac ctg gct acc gtt gtt      1927
Gln Arg Gln Leu Ile Gly Arg Asn Ala Gly Asn Leu Ala Thr Val Val
    295                 300                 305

ggt gac ggt gac cgc gat ctt gcc ttg atg tcg ccc ggc ctg gtc ggc      1975
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66

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Gly Asp Gly Asp Arg Asp Leu Ala Leu Met Ser Pro Gly Leu Val Gly
310             315             320             325

cac tgg cgc cag ttc gat ggt caa cgg aac cgg tcc gcg cac gga ctg    2023
His Trp Arg Gln Phe Asp Gly Gln Arg Asn Arg Ser Ala His Gly Leu
            330             335             340

tgc ctg cgc cga acc gag cac gccgacgacg gccagcgtgc ctgctgcaaa      2074
Cys Leu Arg Arg Thr Glu His
            345

cgatgcaaga aaaacattct tcaccagtga ctctccttgg tcgggggatg cccgcaagcg   2134

cgggcaggcc aaacctaggc agagcgagcg aacgcgacaa gccgttcaat tagcgatatt   2194

tctggatgtg gcgcatgggt tatgcatccg gatacatcac tggtgtagat aattcagcga   2254

taaagcctgc tggcggtcac ggaattgtgg tgcctgtgtg tcgccggctg acacaaacgc   2314

tggcgaccaa tgtgccgttt tgtgaccagg cgcgcctgtt gcctgaatgg acccgcgtga   2374

tcgaccgtgc ggtggcgcac ggaatgcgca aacgtgtcgc gtaacgcgaa caccgggaag   2434

gtgatgcccg cgccagcgct gtgattgcgt tggggtctag caggggcggt gatgtgcgga   2494

gcgatgcgtc ggatgtcgcc gcgccagaca cccacgcacc atcacacgcg cttggcagcc   2554

gcgcatgagg cctggttagc cgtgcctagt gggcgcggtc gaccgcgaag cggccgaggc   2614

tggccaaggt ggcgccggat tcgccgtagg gcagcaacag cgcatgcata tggctggcca   2674

gttccgccag cttggttttg gcgccgtcca tgcccagcaa ggcggggtag gtggacttgg   2734

actgcgccgc atccttgccg gcagtcttgc cgagctgggc ggagcttgat tccacatcca   2794

ggatgtcgtc acgcacctgg aacgcgagcc ccagcgcgtc ggcaaacgca tccaggcgct   2854

gctggtcggc aatacccgcg ccgcctgtca gcacgcccat gcgcaccgcg cgcgggatca   2914

gcgcaccggt cttgagtgca tgcatgcgct gcagtgcctc cagcgcctgc acctgcccgg   2974

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ggctctgcaa                                                         3044


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gattaacgag gaaagctgcc ccctcggcat gcgccaagcg acttcgcgac ccccgtcgaa   180

accagtgcac ccccgggaa agcatcaaaa cgctgacgtg accagtgtag ggatcggcgc   240

gcccggtcac aagtagtgag ataggcagcg cttacagtgg cttcagttgc acagtccgga   300

actatccgga actgaaggag ctactggatg agcacaggca agcgccccac cggcccgcgc   360

acgacgcgcg ccgcaaccaa gaaggccgcc aagaccgccc cgccggccaa gcgccgttcg   420

gggcgtcagg ccgccgccaa ggcggaaacg caagaggaaa acggccatcg cacgcgggtg   480

cagggcaagg cccgcaccgt catctacatc catggcatcg caacaagcc accggccgag   540

gtgttgcgct gccagtggga caaggccttg ttcggccgcc cgatgggtga gcgcacgcgg   600

ctggcgtact gggtcaaccg cgagcgctac ccggtgccgg agcccggcag ttgcgatggc   660

cgcgatgtgg ggccggcgtt gaaccagagc gtgcagcggg cgttgagcac gctggggctg   720

gtgccgggcg agcaggacct gcatgcgctg gccgatgcgc tggcacagag cgagcaggag   780

cgtgctgacc tgcaccagat gctggacgag ctgcaggccg cgccactcgc cggtggcatg   840

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ctgctgcagg acgtgcacga tctgttcttt gtcccggagc gggccgcgca gatgcgcgaa   960

agcctggcgc aacggttgcg cgccggtggc ggtcccgttc gtg gtg gtg gcg cac  1015
                                               Val Val Val Ala His
                                               1                 5

agc cag ggc tcg atg att gcc tac gat gtg ctg cgg cag ttg cag gcc  1063
Ser Gln Gly Ser Met Ile Ala Tyr Asp Val Leu Arg Gln Leu Gln Ala
                10              15                  20

gat ggc tgc gag gtg gcg ctg ttt ctg acc ctg ggc tcg ccg ctg ggc  1111
Asp Gly Cys Glu Val Ala Leu Phe Leu Thr Leu Gly Ser Pro Leu Gly
            25                  30                  35

ttg ccg cag gtg cgc agc atg ttc aag cgc tgg acc ggg acg cgc aaa  1159
Leu Pro Gln Val Arg Ser Met Phe Lys Arg Trp Thr Gly Thr Arg Lys
            40                  45                  50

ctg ccg ttc ccc gac tgc gtg cgg cgc tgg gtc aac gtg gcc gaa acg  1207
Leu Pro Phe Pro Asp Cys Val Arg Arg Trp Val Asn Val Ala Glu Thr
        55                  60                  65

cgc gat ccg atc gcg ctg gat cca gac ctg acc gac gac ata gcc aat  1255
Arg Asp Pro Ile Ala Leu Asp Pro Asp Leu Thr Asp Asp Ile Ala Asn
70                  75                  80                  85

gcc aaa ggg cgg ttc gaa aac atc gcc gcc gcg cgg ctc aac ccg gac  1303
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68

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Ala Lys Gly Arg Phe Glu Asn Ile Ala Ala Ala Arg Leu Asn Pro Asp
            90                  95                 100

tgg gag cac aac ccg cat tcg ggc tcg gga tat ttg gcc att gcg cag    1351
Trp Glu His Asn Pro His Ser Gly Ser Gly Tyr Leu Ala Ile Ala Gln
            105             110                 115

gtg cgt gca gcg gtg cgg cag gcg gtg ggt gtg ggc ttc gat cag ccg    1399
Val Arg Ala Ala Val Arg Gln Ala Val Gly Val Gly Phe Asp Gln Pro
            120             125                 130

gtc tcc aat gcg gtg ctg atc aag gac ctc agt gag cag ctc gaa gcg    1447
Val Ser Asn Ala Val Leu Ile Lys Asp Leu Ser Glu Gln Leu Glu Ala
            135             140                 145

cac ggc gcg gac tat cgg cac gag gtg ttg atc gaa ctg gac cgt cgc    1495
His Gly Ala Asp Tyr Arg His Glu Val Leu Ile Glu Leu Asp Arg Arg
150                 155                 160                 165

gtc ctg ggt gcg gac ccg gcc ggc gtg cgt gcg cag ttg atc acc cac    1543
Val Leu Gly Ala Asp Pro Ala Gly Val Arg Ala Gln Leu Ile Thr His
                170                 175                 180

atg cgc cag att gcc ggg cat agc acc ggc ctg gac ggc gat gca ttg    1591
Met Arg Gln Ile Ala Gly His Ser Thr Gly Leu Asp Gly Asp Ala Leu
                185                 190                 195

gac gag gcg atc gaa ctc gaa gac agc ctg cag cgc ctc att tcg gcg    1639
Asp Glu Ala Ile Glu Leu Glu Asp Ser Leu Gln Arg Leu Ile Ser Ala
            200                 205                 210

cgg ctg acg cgg ttc gag atc gaa acg ctg caa agc cgc tac cgc gca    1687
Arg Leu Thr Arg Phe Glu Ile Glu Thr Leu Gln Ser Arg Tyr Arg Ala
            215                 220                 225

ctg ggt ttc cgg cgc gtc tgg cgc gat gcc ggc aag cgg gcg ctg atc    1735
Leu Gly Phe Arg Arg Val Trp Arg Asp Ala Gly Lys Arg Ala Leu Ile
230                 235                 240                 245

cac gtc tcg ggc aac gtg ctg cat gtg gat gca gca cgc acg gcg tat    1783
His Val Ser Gly Asn Val Leu His Val Asp Ala Ala Arg Thr Ala Tyr
                250                 255                 260

cgc gca cgt ggg cag cag atc ggc tgg gcg gtc ctg gat acc ggc att    1831
Arg Ala Arg Gly Gln Gln Ile Gly Trp Ala Val Leu Asp Thr Gly Ile
                265                 270                 275

gcg gcc gcg cat ccg cat ttc ttc gtg ccg ggc gag cgc gac aat gtg    1879
Ala Ala Ala His Pro His Phe Phe Val Pro Gly Glu Arg Asp Asn Val
                280                 285                 290

gtg gcg caa tgg gat tgc acg cgg cgc ggc gcg ccc aag cgg ctg acg    1927
Val Ala Gln Trp Asp Cys Thr Arg Arg Gly Ala Pro Lys Arg Leu Thr
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cgg gcc gat ggc aaa cgg ttc acc gca ctc gac ggg cac ggc cat ggc    1975
Arg Ala Asp Gly Lys Arg Phe Thr Ala Leu Asp Gly His Gly His Gly
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acg cac atc gcc ggc atc atc gcc ggc tgt tgc cgg gcg gcg gtg cct    2023
Thr His Ile Ala Gly Ile Ile Ala Gly Cys Cys Arg Ala Ala Val Pro
            330                     335                     340

gat gcc agt ggc aag ccg ggc gaa ctg ctg gaa ttt gcc ggc atg gcg    2071
Asp Ala Ser Gly Lys Pro Gly Glu Leu Leu Glu Phe Ala Gly Met Ala
            345                     350                     355

ccg gag acg caa ctc tat ggc ttc aag gtg ctg gac gac gcc ggc aac    2119
Pro Glu Thr Gln Leu Tyr Gly Phe Lys Val Leu Asp Asp Ala Gly Asn
            360                     365                     370

ggg cgc gat tcg tgg atg atc aag gca gtg cag cac gtg gcc gat ctc    2167
Gly Arg Asp Ser Trp Met Ile Lys Ala Val Gln His Val Ala Asp Leu
            375                     380                     385

aac gag cgt gcc ggc gag ctg gtg atc cac ggc gtc aat ctc agc ctg    2215
Asn Glu Arg Ala Gly Glu Leu Val Ile His Gly Val Asn Leu Ser Leu
390                     395                     400                     405

ggc ggg tac ttc gat ccg gaa agc tac ggc tgt ggc ttc acg ccg tta    2263
Gly Gly Tyr Phe Asp Pro Glu Ser Tyr Gly Cys Gly Phe Thr Pro Leu
            410                     415                     420

tgc aac gag ttg cgg cgg tta tgg cgg cag ggc gta ctg gta gtg gtg    2311
Cys Asn Glu Leu Arg Arg Leu Trp Arg Gln Gly Val Leu Val Val Val
            425                     430                     435

gcg gcc ggc aac gaa ggc ctg gcc tgg ctg atg cag aac gac ggc ggc    2359
Ala Ala Gly Asn Glu Gly Leu Ala Trp Leu Met Gln Asn Asp Gly Gly
            440                     445                     450

acc tat ccg gcg aac atg gat ctg tcg atc agc gat ccg ggc aat ctg    2407
Thr Tyr Pro Ala Asn Met Asp Leu Ser Ile Ser Asp Pro Gly Asn Leu
            455                     460                     465

gag gac gcg atc gtg gtg gga tcg gtg cac aag agc agc ccg cac aat    2455
Glu Asp Ala Ile Val Val Gly Ser Val His Lys Ser Ser Pro His Asn
470                     475                     480                     485

tac ggc gtg tcg tat ttt tca tcc cgc ggg ccg acc gcc gat ggc cgc    2503
Tyr Gly Val Ser Tyr Phe Ser Ser Arg Gly Pro Thr Ala Asp Gly Arg
            490                     495                     500

tcc aaa cct gat gtg gtc gcc ccg ggc gaa aag atc ctg tcc gct tac    2551
Ser Lys Pro Asp Val Val Ala Pro Gly Glu Lys Ile Leu Ser Ala Tyr
            505                     510                     515

tac ggc ttc gac ccg cgc gac ccg tcc agc ctg atg gtc gag atg agc    2599
Tyr Gly Phe Asp Pro Arg Asp Pro Ser Ser Leu Met Val Glu Met Ser
            520                     525                     530

ggc acc agc atg gcc gca ccg cat gtg tcc ggc gtg ctg gcc ggg ttt    2647
Gly Thr Ser Met Ala Ala Pro His Val Ser Gly Val Leu Ala Gly Phe
            535                     540                     545
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70

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tta tcc gca cgc cgc gag ttc atc ggc ttt ccg gac cgg gtc aag caa    2695
Leu Ser Ala Arg Arg Glu Phe Ile Gly Phe Pro Asp Arg Val Lys Gln
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ctg ctg ctg gac acc tgc acc gac ctg cag cgc gat cgt tac gtg cag    2743
Leu Leu Leu Asp Thr Cys Thr Asp Leu Gln Arg Asp Arg Tyr Val Gln
                570             575             580

ggc agg ggg gtg ccg aat ttg atg cgg atg ctt gga gag acg tga        2788
Gly Arg Gly Val Pro Asn Leu Met Arg Met Leu Gly Glu Thr
        585             590             595

ttcgggagtc gggatttggg attcgcaaac gcggtggttg gctgaacaaa aacggccgcg    2848

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gcacggcctc aaagcagccc aaaccatcgc aacttgcggt ctcagcaaat gctcagctca    2968

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atgtgcttga agaggacgac gcccacatcg tggcgcggct ggacctgggg ctcggttcgt    3748

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71

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ccagcgtggc cggtattgcc tcgcaaaacc gcctcggtgc cggtgtcggt ttccagaacg   720

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actgacgcct gatccacgaa aaactgaaga ggacttcacc gtg atc gac aag aat   1015
                                            Val Ile Asp Lys Asn
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ttc cgt ctc aac ccg ctg act ggc gcc atc ttg atg atg gcc ctg ggt   1063
Phe Arg Leu Asn Pro Leu Thr Gly Ala Ile Leu Met Met Ala Leu Gly
                 10   15   20

gct tcg ggc acc ctc gtt gct gcc ccc gcg ttg cag gtc aag gaa ccg   1111
Ala Ser Gly Thr Leu Val Ala Ala Pro Ala Leu Gln Val Lys Glu Pro
             25   30   35

acc caa gcc gcg ccg gcc gcc agc gat ttc agc agc cgg ttg atc gtg   1159
Thr Gln Ala Ala Pro Ala Ala Ser Asp Phe Ser Ser Arg Leu Ile Val
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cgt tac aag gac ggc acg gcc gcc gcg agc gat cgc agc agc aag ctg   1207
Arg Tyr Lys Asp Gly Thr Ala Ala Ala Ser Asp Arg Ser Ser Lys Leu
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ggc gtg gtg caa tcg gcc gtg ggc cgt gcc gca ccg gtg acc ggt gcg   1255
Gly Val Val Gln Ser Ala Val Gly Arg Ala Ala Pro Val Thr Gly Ala
70   75   80   85

72

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cgt gct ggc gcc acc gcc gcc aag gcg acc tac ctg cgc aag ctg ggc    1303
Arg Ala Gly Ala Thr Ala Ala Lys Ala Thr Tyr Leu Arg Lys Leu Gly
                90              95              100

att ggc tcg gac ctg atc aaa ctg tcc ggc acg ctg acc gcc gca cag    1351
Ile Gly Ser Asp Leu Ile Lys Leu Ser Gly Thr Leu Thr Ala Ala Gln
            105             110             115

gtg gac aag gtg gtg gtc gag ctg aag aac gac ccg tcc gtg gcc gag    1399
Val Asp Lys Val Val Val Glu Leu Lys Asn Asp Pro Ser Val Ala Glu
            120             125             130

gtg cag atc gac cgc atg ctg cgt ccg gtc gag atc aag aag agc gtt    1447
Val Gln Ile Asp Arg Met Leu Arg Pro Val Glu Ile Lys Lys Ser Val
    135             140             145

gcg gcg acc gac gtg agc ccg cag ctg gtc ccc aac gac ccg ctg tat    1495
Ala Ala Thr Asp Val Ser Pro Gln Leu Val Pro Asn Asp Pro Leu Tyr
150             155             160             165

gcg cag tac cag tgg cac ctg agc aac ccc aac ggc ggc atc aac gcg    1543
Ala Gln Tyr Gln Trp His Leu Ser Asn Pro Asn Gly Gly Ile Asn Ala
                170             175             180

ccg gcc gca tgg gac ctc tcg caa ggt gcc ggc gtg gtg gtg gcg gtg    1591
Pro Ala Ala Trp Asp Leu Ser Gln Gly Ala Gly Val Val Val Ala Val
                185             190             195

ctg gat acc ggc atc ctg ccg ggc cat ccg gac ttc gcc ggc aac ctg    1639
Leu Asp Thr Gly Ile Leu Pro Gly His Pro Asp Phe Ala Gly Asn Leu
            200             205             210

ttg cag ggc tat gac ttc atc acc gac gcc gaa gtc tcg cgt cgc ccc    1687
Leu Gln Gly Tyr Asp Phe Ile Thr Asp Ala Glu Val Ser Arg Arg Pro
    215             220             225

acc gac gcc cgc gtc ccg ggc gcg ctg gac tac ggt gac tgg gaa gag    1735
Thr Asp Ala Arg Val Pro Gly Ala Leu Asp Tyr Gly Asp Trp Glu Glu
230             235             240             245

gcc gat aac gtc tgc tac gac ggg tcg gtc gcc cag gaa agc tcc tgg    1783
Ala Asp Asn Val Cys Tyr Asp Gly Ser Val Ala Gln Glu Ser Ser Trp
                250             255             260

cac ggc acc cat gtc tcg ggc acc gtg gcc gag gca acc aat aac ggt    1831
His Gly Thr His Val Ser Gly Thr Val Ala Glu Ala Thr Asn Asn Gly
                265             270             275

ttg ggc atg gcg ggc gtg gcg ccg aag gcc acc atc ctg ccg gtg cgc    1879
Leu Gly Met Ala Gly Val Ala Pro Lys Ala Thr Ile Leu Pro Val Arg
            280             285             290

gtg ctc ggc cgc tgc ggc ggc tac acc tcc gac atc gcc gat gcg atc    1927
Val Leu Gly Arg Cys Gly Gly Tyr Thr Ser Asp Ile Ala Asp Ala Ile
    295             300             305
```

73

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gtg tgg gcc tcc ggc ggt acg gtc gat ggc gtc ccc gcc aac acc aac      1975
Val Trp Ala Ser Gly Gly Thr Val Asp Gly Val Pro Ala Asn Thr Asn
310                 315                 320                 325

ccg gcc gaa gtg atc aac atg agc ctg ggc ggc ggc gag ccc tgc gat      2023
Pro Ala Glu Val Ile Asn Met Ser Leu Gly Gly Gly Glu Pro Cys Asp
                    330                 335                 340

ccg gcc acc cag gtc gcg atc aac ggc gcg gtg tcg cgc ggc acc acc      2071
Pro Ala Thr Gln Val Ala Ile Asn Gly Ala Val Ser Arg Gly Thr Thr
                345                 350                 355

gtg gtg gtg gcg gcc ggc aac agc ggc gaa gat gcg gcc aac cat tca      2119
Val Val Val Ala Ala Gly Asn Ser Gly Glu Asp Ala Ala Asn His Ser
            360                 365                 370

ccg gcg agc tgc aac aac acc atc acc gtc ggc gcc acc cgc atc acc      2167
Pro Ala Ser Cys Asn Asn Thr Ile Thr Val Gly Ala Thr Arg Ile Thr
            375                 380                 385

ggc ggc atc acc tac tac tcc aac tac ggc agc aag gtg gac ctg tcc      2215
Gly Gly Ile Thr Tyr Tyr Ser Asn Tyr Gly Ser Lys Val Asp Leu Ser
390                 395                 400                 405

ggt ccc ggc ggc ggc ggc agc gtg gac ggc aac ccg ggt ggt tac atc      2263
Gly Pro Gly Gly Gly Gly Ser Val Asp Gly Asn Pro Gly Gly Tyr Ile
                410                 415                 420

tgg cag gcc ggc tac gac ggc gcc acc acc cca acc tcc ggt agc tat      2311
Trp Gln Ala Gly Tyr Asp Gly Ala Thr Thr Pro Thr Ser Gly Ser Tyr
                425                 430                 435

agc tac atg ggt atg ggc ggc acc tcg atg gcg tcc ccg cac gtg gcc      2359
Ser Tyr Met Gly Met Gly Gly Thr Ser Met Ala Ser Pro His Val Ala
            440                 445                 450

ggc gtc gtg gcc ctg gtg cag agc gcg tcg atc ggc ctg ggc gat ggc      2407
Gly Val Val Ala Leu Val Gln Ser Ala Ser Ile Gly Leu Gly Asp Gly
    455                 460                 465

ccg ctg acc ccg gcg gcg atg gaa gcc ctg ctc aag cag gcc agc cgc      2455
Pro Leu Thr Pro Ala Ala Met Glu Ala Leu Leu Lys Gln Ala Ser Arg
470                 475                 480                 485

cgc ttc ccg gtg acc ccg ccg acc agc acc ccg atc ggc agc ggc atc      2503
Arg Phe Pro Val Thr Pro Pro Thr Ser Thr Pro Ile Gly Ser Gly Ile
                490                 495                 500

gtc gac gcc aag gcc gcg ctg gaa gcg gta ttg gtg gag ccg tgc gac      2551
Val Asp Ala Lys Ala Ala Leu Glu Ala Val Leu Val Glu Pro Cys Asp
                505                 510                 515

ccg gac acc gag acc tgc gcg ccg gcc gcc att gcc ctg acc aac aag      2599
Pro Asp Thr Glu Thr Cys Ala Pro Ala Ala Ile Ala Leu Thr Asn Lys
                520                 525                 530

gcg ccg ctg acc ggc ctg agc ggt gag tac aac agc tcc acg ttg tac      2647
```

74

```
Ala Pro Leu Thr Gly Leu Ser Gly Glu Tyr Asn Ser Ser Thr Leu Tyr
    535              540              545

agc ttc gaa gcc aag gcc ggt gcg gtg ctg agc ttc atg acc tac ggc    2695
Ser Phe Glu Ala Lys Ala Gly Ala Val Leu Ser Phe Met Thr Tyr Gly
550              555              560              565

ggc acc ggt aac gtg tcg gtc tac gtg agc ttc gaa gcc gag ccc acc    2743
Gly Thr Gly Asn Val Ser Val Tyr Val Ser Phe Glu Ala Glu Pro Thr
                 570              575              580

gca acc gat tac gac gcc aag tcc acc cgt ccg ggc aac agc gaa acg    2791
Ala Thr Asp Tyr Asp Ala Lys Ser Thr Arg Pro Gly Asn Ser Glu Thr
             585              590              595

gtg cgc ttc acc gca ccc aag gct ggt acc tac tac atc aag ctg gtg    2839
Val Arg Phe Thr Ala Pro Lys Ala Gly Thr Tyr Tyr Ile Lys Leu Val
         600              605              610

ggt gca ggg gac tac gcg aag ctg acg ctc gtc gcg cga cag taa    2884
Gly Ala Gly Asp Tyr Ala Lys Leu Thr Leu Val Ala Arg Gln
    615              620              625

tcgctgcaat agtgtgaccg aatgcccccg gccaatcacc gggggcattc gttttttcagg    2944

gcctttcgca gtggtgcggt tgatcgtcgc ggcaaactgc tacagtcggc gccggacttg    3004

tggagacgag tgtgaacgcg gttgccgtcg atccaattga gcagcgaagt gcagaaacgc    3064

gcatcgtcga agcactgctt gaacgccgtc gtctgaagga caccgacctg ctgcgcgcgc    3124

gccagctgca ggccgaatcc ggcatgggcc tgttggcgct gctgggccgg ttggggctgg    3184

tgtccgagcg cgatcatgcc gagacctgcg ccgaggtgct cggcttgccg ctggtggatg    3244

cacgccagct cggcgacacc ccgccggaaa tgctgcctga ggtgcagggc ctgtcgctgc    3304

gctttctcaa gcaatttcat ctgtgcccgg tcggcgaacg cgatggccgg ctcgacctgt    3364

ggattgccga tccctacgac gattacgcga tcgatgcggt gcgcctggcc accggcctgc    3424

cgctgctgct gcacgtgggc ctgcgctcgg aaatcgacga cctgatcgag cgctggtacg    3484

ggcagggccg cagcgcaatg ggcacgatcg tggaaaccgc cgacggcgat gccagcagca    3544

ccgacgacat cgaagcgcta cgcgatcttg cctccgaagc gccggtgatc cgcctggtga    3604

atctggtgat ccagcacgcg gtggaattgc gcgcctcgga catccatatc gaaccgttcg    3664

aaagccggct caaggtgcgt taccgcgtgg atggcgtgct ggtggaaggc gaaagcccgc    3724

cggccaagct caccgccgcg gtgatcagcc gcatcaagat catggccaag ctcaatatcg    3784

ccgagcgccg cctgccgcag gacggccgca tcatgctgcg cgtgcagggc aaggagctgg    3844

atctgcgtgt cagcaccgtg cccaccgcgc atggcgagag    3884
```

75

```
gccgcaggcc accacgccat cgggcatggc ttccagcaac aggctcaacg tctgccgctg      60

cgcctgcgca tccaggcggt cgcggcgcgc ctccagctga ttgacggcct gacgcgccag     120

ccggatcaag gcctgtttct ggttctcatc gagcacgcgt ggcctggtgc tgagcatgca     180

caaggtgccg taggcatagc cctcgcggcc gatcagcggc acgcccacat aggagcggat     240

gcccggcgcg gcggtcacca acgggttgtg cgtgaaccgt gggtcggcga gggcatcggg     300

cacttccagc aggtcggtgc ccatcaccgt gtacgagcag aacgacacgc tgcgcggcgt     360

gccttccaga tcggtgccgc agcgcgcctt gaaccactgg cggtcggcat cgagcaggga     420

aatcagcgcc atcggcgaac cgctgatatg cgcggccagc caggcgaggt cgtcgaattc     480

ggcttcggcc gcggtgtcca gcacccccag ccggcgcacc gcatccacgc gcaaggcgtc     540

gttggcgggg atcgggacgg cggcgacag ggcggtcatg aaggaatcgg ctgacaggtc     600

ggatgacggt gggtcgcccc aggtaacggc aaggcgacgg gcaacttgag ccggcgcggc     660

cggggccgct tggagcagct atcaaaacga ctgcgcagcc gccaggcggg cgcggccggt     720

gctcggaatc ggcatgtacc cccgtacact ccggttcctc cgcgccgtcc gcacccacct     780

gacggctgct cgctacgttt tgttagccgc gcttagtccc gtggccattg ccgctgtgcc     840

cacgtggccg gcatggtccc gatggcacgc ccatctgctc gctgcggtgc cgaaggtttg     900

ccaggcatcc ggccagcccg ccctcccctg accaccggca tttgcgacgc cgccaagcag     960

ccactaccct cggccgattg tcctgcccct ggagtgtcac atg ctg cgt ccg ttg    1015
                                               Met Leu Arg Pro Leu
                                               1               5

tcc ttg ttg atc gcc ggc gtg ctc ggc gtt gct gcc ggt acc gtt gcg   1063
Ser Leu Leu Ile Ala Gly Val Leu Gly Val Ala Ala Gly Thr Val Ala
                10                  15                  20

ccc gcc gca cag gcc gcc ccg gcc agc ctg tcc aag act gcg aac agc   1111
Pro Ala Ala Gln Ala Ala Pro Ala Ser Leu Ser Lys Thr Ala Asn Ser
            25                  30                  35

agc gcc att ccc gac atc gcc tac acc cgt ttc acc ctg ccc aac ggc   1159
```

```
Ser Ala Ile Pro Asp Ile Ala Tyr Thr Arg Phe Thr Leu Pro Asn Gly
        40                      45                  50

ctg acc gtg gtg gtg cac gaa gac cac aag gcg ccg gtg gtg gcg gtg    1207
Leu Thr Val Val Val His Glu Asp His Lys Ala Pro Val Val Ala Val
        55                      60                  65

agc atc tgg tac cac atc ggt tcc ggc gac gag ccg gcc ggc aag acc    1255
Ser Ile Trp Tyr His Ile Gly Ser Gly Asp Glu Pro Ala Gly Lys Thr
70                      75                  80                  85

ggc ttc gcg cat ctg ttc gag cac ctc atg ttc tcc ggc tcg gaa aac    1303
Gly Phe Ala His Leu Phe Glu His Leu Met Phe Ser Gly Ser Glu Asn
                90                      95                  100

aac aag ggc agc ttc ttc gcg ccg ctg gaa aag gtc ggc acc acc gac    1351
Asn Lys Gly Ser Phe Phe Ala Pro Leu Glu Lys Val Gly Thr Thr Asp
                105                     110                 115

atg aac ggc acc acc tgg ttc gac cgc acc aat tac ttc gaa acc gtg    1399
Met Asn Gly Thr Thr Trp Phe Asp Arg Thr Asn Tyr Phe Glu Thr Val
                120                     125                 130

ccg acc acc gca ctg gat acc gcg ctg tgg ctg gaa tcg gac cgc atg    1447
Pro Thr Thr Ala Leu Asp Thr Ala Leu Trp Leu Glu Ser Asp Arg Met
        135                     140                 145

ggc cac ctg ctc ggc gcc atc ggc cag gaa gaa ctc gac acc cag cgc    1495
Gly His Leu Leu Gly Ala Ile Gly Gln Glu Glu Leu Asp Thr Gln Arg
150                     155                     160                 165

ggc gtg gtg cag aac gaa aag cgc cag ggc gaa aac cgc ccc tat ggc    1543
Gly Val Val Gln Asn Glu Lys Arg Gln Gly Glu Asn Arg Pro Tyr Gly
                170                     175                 180

cgc gtg gac cag aac atc ctg tcc aac ctg ttt ccg gcc aac cat cct    1591
Arg Val Asp Gln Asn Ile Leu Ser Asn Leu Phe Pro Ala Asn His Pro
                185                     190                 195

tac cag cac gac acc atc ggc tcg atg gaa gac ctg gac gcg gcc tcg    1639
Tyr Gln His Asp Thr Ile Gly Ser Met Glu Asp Leu Asp Ala Ala Ser
                200                     205                 210

ctg gcg gat gtc aaa cag tgg ttc aac gat aac tac ggc gcg gcc aat    1687
Leu Ala Asp Val Lys Gln Trp Phe Asn Asp Asn Tyr Gly Ala Ala Asn
        215                     220                 225

acc acc ctg gtg ctg gcc ggc gac atc acc gtg gcg cag gcc cgc gcc    1735
Thr Thr Leu Val Leu Ala Gly Asp Ile Thr Val Ala Gln Ala Arg Ala
230                     235                     240                 245

aag gcc gag cag tac ttt ggc gat atc ccg tcc ggc aag ccg gtg gcg    1783
Lys Ala Glu Gln Tyr Phe Gly Asp Ile Pro Ser Gly Lys Pro Val Ala
                250                     255                 260

cgt cag cag ccg tgg gtg acc ccg ctg gcc gca cag aag cgc ggc gtg    1831
Arg Gln Gln Pro Trp Val Thr Pro Leu Ala Ala Gln Lys Arg Gly Val
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77

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cag cac gac cat gtg tcg cag ccg cgc atc tac cgc acc tgg gcc gcg   1879
Gln His Asp His Val Ser Gln Pro Arg Ile Tyr Arg Thr Trp Ala Ala
        280                 285                 290

ccg cag ttg ggc acc gac gac atg atc cag ctg gat ctg gcc acc acc   1927
Pro Gln Leu Gly Thr Asp Asp Met Ile Gln Leu Asp Leu Ala Thr Thr
        295                 300                 305

gtg ctg ggc ggc ggc aag acc tcg cgg ctg tac cag cgc ctg gtc tat   1975
Val Leu Gly Gly Gly Lys Thr Ser Arg Leu Tyr Gln Arg Leu Val Tyr
310                 315                 320                 325

cag gac cag ctg gtg gac gat gtt tcc gcg tcg atc cag ccg ttc gcg   2023
Gln Asp Gln Leu Val Asp Asp Val Ser Ala Ser Ile Gln Pro Phe Ala
        330                 335                 340

ctg gcc agc cag atg cag atc cag gcc gac gtg aaa gat ggt gtg gac   2071
Leu Ala Ser Gln Met Gln Ile Gln Ala Asp Val Lys Asp Gly Val Asp
        345                 350                 355

ccg gcc aag gtc gag gcc atc atc gat gaa gag ctg aag aag ttc ctc   2119
Pro Ala Lys Val Glu Ala Ile Ile Asp Glu Glu Leu Lys Lys Phe Leu
        360                 365                 370

gcc gaa ggc ccc act gcc gac gaa ctg caa cgc gcc cag gtg gcc tac   2167
Ala Glu Gly Pro Thr Ala Asp Glu Leu Gln Arg Ala Gln Val Ala Tyr
        375                 380                 385

cgc gcc ggc ttc gtg cgc ggg ctg gag aag gtg ggc ggt ttc ggt ggc   2215
Arg Ala Gly Phe Val Arg Gly Leu Glu Lys Val Gly Gly Phe Gly Gly
390                 395                 400                 405

aag gcg gtg atc ctg gcc gag ggc cag gtc tat cgt ggc gac ccg ggt   2263
Lys Ala Val Ile Leu Ala Glu Gly Gln Val Tyr Arg Gly Asp Pro Gly
                410                 415                 420

gcc tac aag cag gac ctg cag cgc ggc cag gcc gcc acc atc ggc agc   2311
Ala Tyr Lys Gln Asp Leu Gln Arg Gly Gln Ala Ala Thr Ile Gly Ser
        425                 430                 435

gtc aag cag gcc gca tcg acc tgg ttc ggc aag ggc gac tac ctg ctc   2359
Val Lys Gln Ala Ala Ser Thr Trp Phe Gly Lys Gly Asp Tyr Leu Leu
        440                 445                 450

acc gta ctg ccg gcc ggc aag gac ttc gac ccc gcc gcc gaa gac aag   2407
Thr Val Leu Pro Ala Gly Lys Asp Phe Asp Pro Ala Ala Glu Asp Lys
        455                 460                 465

gcg gtg gtc gcg cgc ggc acc gag ccg ggc aag ccc gcg ccc aag ttg   2455
Ala Val Val Ala Arg Gly Thr Glu Pro Gly Lys Pro Ala Pro Lys Leu
470                 475                 480                 485

ccg gcg gcg gcc aag tac aaa gtc acc gcc agc aag ctc gat cgc agc   2503
Pro Ala Ala Ala Lys Tyr Lys Val Thr Ala Ser Lys Leu Asp Arg Ser
                490                 495                 500
```

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aag ggc gtg ccc gac acc gcc agc ttc ccg gac ctg agc ttc ccg cag     2551
Lys Gly Val Pro Asp Thr Ala Ser Phe Pro Asp Leu Ser Phe Pro Gln
        505                 510                 515

ctg cag cgc ggc aag ctg aag aac ggc gtg gaa gtg atc ctg gcc gaa     2599
Leu Gln Arg Gly Lys Leu Lys Asn Gly Val Glu Val Ile Leu Ala Glu
        520                 525                 530

cgt cac acc atc ccg gtc acc cag gtg gag ctg ttg ttc gac gcc ggc     2647
Arg His Thr Ile Pro Val Thr Gln Val Glu Leu Leu Phe Asp Ala Gly
        535                 540                 545

tac gcc gcc gac cag ggc aag aag ctt ggc acc gcc agc ttc agc gcc     2695
Tyr Ala Ala Asp Gln Gly Lys Lys Leu Gly Thr Ala Ser Phe Ser Ala
550                 555                 560                 565

gcg ctg atg aac gag agc acc gcg tcg ctg gat tcg gtg gaa gtg gcg     2743
Ala Leu Met Asn Glu Ser Thr Ala Ser Leu Asp Ser Val Glu Val Ala
                570                 575                 580

cag cgc cgc cag cgc ctg ggc gcc atc acc gag gtg ggc tgc gat ctg     2791
Gln Arg Arg Gln Arg Leu Gly Ala Ile Thr Glu Val Gly Cys Asp Leu
            585                 590                 595

gac agc tgc agc gcc tcg ctg aat gcc ctc aac gac cag ctg cag ccg     2839
Asp Ser Cys Ser Ala Ser Leu Asn Ala Leu Asn Asp Gln Leu Gln Pro
            600                 605                 610

tcg ctg caa ttg ttc tcc gac atc gtg cgc aac ccg gcc ttc aag gcg     2887
Ser Leu Gln Leu Phe Ser Asp Ile Val Arg Asn Pro Ala Phe Lys Ala
            615                 620                 625

gcg gac atc gaa cgc atc cgt ggc cag tgg ctg gcc ggg atc gcg cag     2935
Ala Asp Ile Glu Arg Ile Arg Gly Gln Trp Leu Ala Gly Ile Ala Gln
630                 635                 640                 645

gaa aag acc cag ccc aac agt ctg ggc ctg cgg gcg ctg ccg ccg ctc     2983
Glu Lys Thr Gln Pro Asn Ser Leu Gly Leu Arg Ala Leu Pro Pro Leu
                650                 655                 660

atg tac ggc gac aag cat ccg tac ggc atc ccg ctt acc ggc agc ggc     3031
Met Tyr Gly Asp Lys His Pro Tyr Gly Ile Pro Leu Thr Gly Ser Gly
            665                 670                 675

acc gag gcg gca atc aag agc ctc aat gcc aag gac ctg cag gcc ttc     3079
Thr Glu Ala Ala Ile Lys Ser Leu Asn Ala Lys Asp Leu Gln Ala Phe
            680                 685                 690

cac aac cag tgg ctg cgt ccg gac aac ctg cgc atc ctg gtg gcc ggc     3127
His Asn Gln Trp Leu Arg Pro Asp Asn Leu Arg Ile Leu Val Ala Gly
            695                 700                 705

gat acc acg ctg gcg cag atc atc ccg cag ctg gat gcc gcc ttc ggc     3175
Asp Thr Thr Leu Ala Gln Ile Ile Pro Gln Leu Asp Ala Ala Phe Gly
710                 715                 720                 725
```

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gac tgg acg gcc ccg gcc gca ccg ttg ccg aag aag aac ctg gtc aac   3223
Asp Trp Thr Ala Pro Ala Ala Pro Leu Pro Lys Lys Asn Leu Val Asn
                730                 735                 740

gtg gcc gcg cag ccc aag ccg cgc gtt tac ctg atc aac cgc ccg gac   3271
Val Ala Ala Gln Pro Lys Pro Arg Val Tyr Leu Ile Asn Arg Pro Asp
                745                 750                 755

gcc ccg caa tcg gtc att ctg gcc ggc ctg ttg gca ccg tcg acc aag   3319
Ala Pro Gln Ser Val Ile Leu Ala Gly Leu Leu Ala Pro Ser Thr Lys
                760                 765                 770

gcg ccg gac aac ctg gca atc acg gtg gcc aat ggc gct ttc ggc ggc   3367
Ala Pro Asp Asn Leu Ala Ile Thr Val Ala Asn Gly Ala Phe Gly Gly
                775                 780                 785

acc ttc acc tcg cgc ttg aac atg aac ctg cgt gag aac aag cgc tgg   3415
Thr Phe Thr Ser Arg Leu Asn Met Asn Leu Arg Glu Asn Lys Arg Trp
790                 795                 800                 805

gcc tac ggt gcg cgg acc caa ctg gtg gat gcg cag ggc cag cgg ccg   3463
Ala Tyr Gly Ala Arg Thr Gln Leu Val Asp Ala Gln Gly Gln Arg Pro
                810                 815                 820

tac atg ttt gcc gcg ccg gtg cag acc gac aag acc gcc gag tcc gcc   3511
Tyr Met Phe Ala Ala Pro Val Gln Thr Asp Lys Thr Ala Glu Ser Ala
                825                 830                 835

aat gaa atc ttc aag gaa gcc acg gcc atc atc ggc gac aag ccg ctg   3559
Asn Glu Ile Phe Lys Glu Ala Thr Ala Ile Ile Gly Asp Lys Pro Leu
                840                 845                 850

acc acc gag gag atc gag aag atc aag aac cag cgc atc cgc gcc ctg   3607
Thr Thr Glu Glu Ile Glu Lys Ile Lys Asn Gln Arg Ile Arg Ala Leu
        855                 860                 865

ccc ggc agc ttc gaa acc acc ggt gca gtg ctc ggt gcg atc gaa ggc   3655
Pro Gly Ser Phe Glu Thr Thr Gly Ala Val Leu Gly Ala Ile Glu Gly
870                 875                 880                 885

atc gtg cag ttc gac cgc ccg gac aac tac gtg caa aca ctc aag ccg   3703
Ile Val Gln Phe Asp Arg Pro Asp Asn Tyr Val Gln Thr Leu Lys Pro
                890                 895                 900

cgc ctg gaa gcg atc gat cag ccg gcc gcg caa gcc gcc atc aag gac   3751
Arg Leu Glu Ala Ile Asp Gln Pro Ala Ala Gln Ala Ala Ile Lys Asp
                905                 910                 915

atc atc gcg ccc aat gcg atg acc tgg gtg atc gtg ggc gac ctg aag   3799
Ile Ile Ala Pro Asn Ala Met Thr Trp Val Ile Val Gly Asp Leu Lys
                920                 925                 930

aag atc gaa gcc ccg gtg cgc gcg ctc aag ctg ggc gag gtg cag gtg   3847
Lys Ile Glu Ala Pro Val Arg Ala Leu Lys Leu Gly Glu Val Gln Val
        935                 940                 945

ctg gac acc gac ggc aag ccg gtc aag cgc tga tcgcaatgac cggcacggcc   3900
Leu Asp Thr Asp Gly Lys Pro Val Lys Arg
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Leu Asp Thr Asp Gly Lys Pro Val Lys Arg
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agtcgctttc gttccaggac gcgattcgcg tttaacgcga ccgcgtggta cgagcccgca   180

cccgcttagc cagggtgcgg atctcacaca cgggcatcgg cacaggccgc tgccacaaca   240

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ggaagactga tgagcattgt gactaaagcc ctgaacctgg tgcccatggt ggtcgagcag    300

accagccgtg gcgagcgtgc gtatgacatc tactcgcgtc tgctgaagga gcgtctgatc    360

ttcctggtcg gtccgatcga cgaccatatg gccaacgtga tcgtggcgca gctgctgttc    420

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gaacgtcgtc cggaagagtc gatccagccg tcttgagtcg cagacgcctg aaattgctgg    900

aaaaactggc agggtcgggc tggacgaatg tctcccgacc ctgtgctatt ctcgaaatcg    960

aacccccgtg catcgggtgg ggtaactggg taacagaagc atg agc gaa gac cgc   1015
                                               Met Ser Glu Asp Arg
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caa ggt cgt tcc ggc gac agc aac aag att ctc tac tgc tcg ttc tgc   1063
Gln Gly Arg Ser Gly Asp Ser Asn Lys Ile Leu Tyr Cys Ser Phe Cys
             10              15                  20

ggt aag agt cag cat gag gtc cgc aag ctg att gcc ggt ccc agc gta   1111
Gly Lys Ser Gln His Glu Val Arg Lys Leu Ile Ala Gly Pro Ser Val
             25              30                  35

ttc att tgc gat gag tgc gtg gag ctg tgc aac gac atc att cgc gag   1159
Phe Ile Cys Asp Glu Cys Val Glu Leu Cys Asn Asp Ile Ile Arg Glu
             40              45                  50

gaa ctc gaa gag aag gcg cag tcg gca cgt tcc agc ctg ccc aag ccg   1207
Glu Leu Glu Glu Lys Ala Gln Ser Ala Arg Ser Ser Leu Pro Lys Pro
     55              60                  65

cgc gag atc ctt gag gtg ctg gac cag tac gtg atc ggt cag ctg cgc   1255
Arg Glu Ile Leu Glu Val Leu Asp Gln Tyr Val Ile Gly Gln Leu Arg
70               75                  80                  85

gcc aag cgc acg ctc gcg gtg gcg gtg tac aac cac tac aag cgg atc   1303
Ala Lys Arg Thr Leu Ala Val Ala Val Tyr Asn His Tyr Lys Arg Ile
                 90                  95                 100

gag agc cgg agc aag aac gac gag gtc gaa ctt gcc aag tcc aac atc   1351
Glu Ser Arg Ser Lys Asn Asp Glu Val Glu Leu Ala Lys Ser Asn Ile
                105                 110                 115

ctg ctg gtc ggc ccg acc ggc tcg ggc aag acg ctg ctg gcc gaa acg   1399
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82

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        Leu Leu Val Gly Pro Thr Gly Ser Gly Lys Thr Leu Leu Ala Glu Thr
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        Leu Ala Arg Leu Leu Asn Val Pro Phe Thr Ile Ala Asp Ala Thr Thr
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        ctg acc gaa gcc ggc tat gtc ggc gag gac gtg gaa aac atc atc cag    1495
        Leu Thr Glu Ala Gly Tyr Val Gly Glu Asp Val Glu Asn Ile Ile Gln
        150                 155                 160                 165

        aag ctg ctg cag aag tgc gac tac gac gtc gag aaa gcg cag cag ggc    1543
        Lys Leu Leu Gln Lys Cys Asp Tyr Asp Val Glu Lys Ala Gln Gln Gly
                        170                 175                 180

        atc gtc tac atc gat gaa atc gac aag atc tcg cgc aag agc gaa aac    1591
        Ile Val Tyr Ile Asp Glu Ile Asp Lys Ile Ser Arg Lys Ser Glu Asn
                        185                 190                 195

        ccg tcg atc acc cgc gac gtg tct ggc gaa ggc gtg cag cag gcg ttg    1639
        Pro Ser Ile Thr Arg Asp Val Ser Gly Glu Gly Val Gln Gln Ala Leu
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        ctg aag ctg atc gaa ggt acg gtg gct tcg gtg ccg ccg cag ggt ggg    1687
        Leu Lys Leu Ile Glu Gly Thr Val Ala Ser Val Pro Pro Gln Gly Gly
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        cgt aag cat ccg cag cag gaa ttc ctg cag gtc gat acc aag aac atc    1735
        Arg Lys His Pro Gln Gln Glu Phe Leu Gln Val Asp Thr Lys Asn Ile
        230                 235                 240                 245

        ctg ttc atc tgc ggc ggc gcg ttt gcc ggg ctg gac aag gtg atc cag    1783
        Leu Phe Ile Cys Gly Gly Ala Phe Ala Gly Leu Asp Lys Val Ile Gln
                        250                 255                 260

        gcg cgt tcc aac gat gcc ggt ggt atc ggc ttc ggc gcc aag gtc aag    1831
        Ala Arg Ser Asn Asp Ala Gly Gly Ile Gly Phe Gly Ala Lys Val Lys
                        265                 270                 275

        agc agc gag cgc aag cag gaa gtc ggc aag atc ctg gcc gaa gtc gag    1879
        Ser Ser Glu Arg Lys Gln Glu Val Gly Lys Ile Leu Ala Glu Val Glu
                280                 285                 290

        ccg gaa gac ctg atc aag ttc ggc ttg atc ccc gag ttc gtc ggc cgc    1927
        Pro Glu Asp Leu Ile Lys Phe Gly Leu Ile Pro Glu Phe Val Gly Arg
                295                 300                 305

        ctg ccg gtg gtc gcc acg ctc gag gaa ctc gat gag ccg gcg ctg atc    1975
        Leu Pro Val Val Ala Thr Leu Glu Glu Leu Asp Glu Pro Ala Leu Ile
        310                 315                 320                 325

        aag atc ctg acc gag ccg aag aac gcc atc acc aag cag ttc aag aag    2023
        Lys Ile Leu Thr Glu Pro Lys Asn Ala Ile Thr Lys Gln Phe Lys Lys
                        330                 335                 340

        ctg ttc gag atg gaa agc gtg gag ctg gag ttc cgt ccg gat gca ctg    2071
        Leu Phe Glu Met Glu Ser Val Glu Leu Glu Phe Arg Pro Asp Ala Leu
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83

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tcg gcg atc gcc aag aag gcg ctc aag cgc aag acc ggc gcg cgt ggc   2119
Ser Ala Ile Ala Lys Lys Ala Leu Lys Arg Lys Thr Gly Ala Arg Gly
        360             365             370

ctg cgc acc atc gtg gaa tcg gtg ctg ctg gat acg atg tac gaa ctg   2167
Leu Arg Thr Ile Val Glu Ser Val Leu Leu Asp Thr Met Tyr Glu Leu
    375             380             385

ccg tca cag gaa aac gtg agc aag gtg gtg gtg gat gaa tcg gtg atc   2215
Pro Ser Gln Glu Asn Val Ser Lys Val Val Val Asp Glu Ser Val Ile
390             395             400                     405

gaa cac aag tcc gag ccg tat ctg atc tac cag gcc cag ccg gct ccg   2263
Glu His Lys Ser Glu Pro Tyr Leu Ile Tyr Gln Ala Gln Pro Ala Pro
                410             415             420

gcc aag gcc gcg tct ggc gac tga ggcctcgcgg cgatgccggc aggccgtggc   2317
Ala Lys Ala Ala Ser Gly Asp
                425

ctcgctggcg gctaaagggt ttccgaccgc tacttgcaac acctcgccga tggccccata   2377

acggggccat cggctttttt tacgccccaa ttcctcgatc ccgcggagcg ccccatggcc   2437

cagtcccaac cagaaattct cgatctgcca gtgttgccgc tgcgcgacgt ggtggtgttt   2497

ccgcacatgg tgattccgct gttcgtcggc cgtgacaagt cgatgcgcgc gctggaaaaa   2557

gccatggagg cggacaagcg catcctgttg gttgcgcaga agtcggccga gaccgacgac   2617

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ggcgatctgg acgacgcgcc cggcgaactg gaagaactcg cccgcaagat cgccgaggcc   3217

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ctgcccgctg aaggcgtgga gaccggcagc agcgtgctgg gctcgggcgt gatgttcgac     180

caaatcgaaa aaggcctgga aggcctgtcc aagggcgaag acaaggccct gagcatcgat     240

ttcccggcgg actggcgcgt gccgcagctg gctggcaaga cggtgcaggt gcacgtcaag     300

gcggtcgagg tgtccgagcc ggtgctgccg gaagtcaaca aggagttcat caagagcttc     360

ggcgtgaaga gtggcgatgc cgagcagttc cgcgccgaca tccgcaccaa tctggagcgc     420

gagctcaagg gtgcgctgat gaaccgtctg cgccgtgaag tgggcgagca actgatcgcc     480

gcctacgcgc acgtggaaat gccgccgcgc ctggtcgaga cgaagcccg ttcgatgctg     540

gcgcaacagg tcgaccagat gcgtcgcagc ggccgcaacc cgggcgagat cccggccgat     600

gcgcaccagg ggttcatgga cgccgctgcc aaacgcgtgc tggtaggcct gctggtgggc     660

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ctgatcgcct cgacctacga ggagccggaa caggtcattg agatgtaccg caacgacccc     780

caactgatga gtgggctgca gagccgtgtg atggaggagc aggtgatcga ctggatcgcc     840

gagcgcgcca gcacaccga gcagtcgctt tcgttccagg acgcgattcg cgtttaacgc     900

gaccgcgtgg tacgagcccg cacccgctta gccagggtgc ggatctcaca cacgggcatc     960

ggcacaggcc gctgccacaa caggaagact gatgagcatt gtg act aaa gcc ctg    1015
                                              Val Thr Lys Ala Leu
                                              1                5

aac ctg gtg ccc atg gtg gtc gag cag acc agc cgt ggc gag cgt gcg   1063
Asn Leu Val Pro Met Val Val Glu Gln Thr Ser Arg Gly Glu Arg Ala
              10                  15                  20

tat gac atc tac tcg cgt ctg ctg aag gag cgt ctg atc ttc ctg gtc   1111
Tyr Asp Ile Tyr Ser Arg Leu Leu Lys Glu Arg Leu Ile Phe Leu Val
              25                  30                  35

ggt ccg atc gac gac cat atg gcc aac gtg atc gtg gcg cag ctg ctg   1159
Gly Pro Ile Asp Asp His Met Ala Asn Val Ile Val Ala Gln Leu Leu
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85

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                40                        45                          50

ttc ctg gaa gcg gac aac ccg gaa aag gac atc agc atc tac atc aat    1207
Phe Leu Glu Ala Asp Asn Pro Glu Lys Asp Ile Ser Ile Tyr Ile Asn
    55                  60                  65

tcg ccc ggt ggc gtg gtc acc gcc ggc atg gcg atc tac gac acc atg    1255
Ser Pro Gly Gly Val Val Thr Ala Gly Met Ala Ile Tyr Asp Thr Met
70                  75                  80                  85

cag tac atc aag ccg gac gtg agc acg atc tgc gtg ggc cag gcg gcc    1303
Gln Tyr Ile Lys Pro Asp Val Ser Thr Ile Cys Val Gly Gln Ala Ala
                90                  95                  100

tcg atg ggc gcg ctg ctg ctg gca tcc ggt gcg gcc ggc aag cgc tat    1351
Ser Met Gly Ala Leu Leu Leu Ala Ser Gly Ala Ala Gly Lys Arg Tyr
            105                 110                 115

gcg ctg ccg aat tcg cgc gtg atg atc cat cag ccg ctg ggc ggc ttc    1399
Ala Leu Pro Asn Ser Arg Val Met Ile His Gln Pro Leu Gly Gly Phe
        120                 125                 130

cag ggc cag gcg acc gat atc gac atc cac gcc cgc gag atc ctg acc    1447
Gln Gly Gln Ala Thr Asp Ile Asp Ile His Ala Arg Glu Ile Leu Thr
    135                 140                 145

ttg cgt tcg cgc ttg aac gag atc ctc gcc aag cac acc ggc cag tcg    1495
Leu Arg Ser Arg Leu Asn Glu Ile Leu Ala Lys His Thr Gly Gln Ser
150                 155                 160                 165

ctg gag acc atc gcg cgc gac acc gaa cgc gac aac ttc aag agc gcg    1543
Leu Glu Thr Ile Ala Arg Asp Thr Glu Arg Asp Asn Phe Lys Ser Ala
                170                 175                 180

gtc gat gca cag gct tat ggc ctg gtg gat cag gtg ctg gaa cgt cgt    1591
Val Asp Ala Gln Ala Tyr Gly Leu Val Asp Gln Val Leu Glu Arg Arg
            185                 190                 195

ccg gaa gag tcg atc cag ccg tct tga gtcgcagacg cctgaaattg          1638
Pro Glu Glu Ser Ile Gln Pro Ser
    200                 205

ctggaaaaac tggcagggtc gggctggacg aatgtctccc gaccctgtgc tattctcgaa    1698

atcgaacccc cgtgcatcgg gtggggtaac tgggtaacag aagcatgagc gaagaccgcc    1758

aaggtcgttc cggcgacagc aacaagattc tctactgctc gttctgcggt aagagtcagc    1818

atgaggtccg caagctgatt gccggtccca gcgtattcat ttgcgatgag tgcgtggagc    1878

tgtgcaacga catcattcgc gaggaactcg aagagaaggc gcagtcggca cgttccagcc    1938

tgcccaagcc gcgcgagatc cttgaggtgc tggaccagta cgtgatcggt cagctgcgcg    1998

ccaagcgcac gctcgcggtg gcggtgtaca accactacaa gcggatcgag agccggagca    2058

agaacgacga ggtcgaactt gccaagtcca acatcctgct ggtcggcccg accggctcgg    2118
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86

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gcaagacgct gctggccgaa acgctggcgc gcctgctcaa tgtgccgttc acgattgccg    2178

atgccaccac gctgaccgaa gccggctatg tcggcgagga cgtggaaaac atcatccaga    2238

agctgctgca gaagtgcgac tacgacgtcg agaaagcgca gcagggcatc gtctacatcg    2298

atgaaatcga caagatctcg cgcaagagcg aaaacccgtc gatcacccgc gacgtgtctg    2358

gcgaaggcgt gcagcaggcg ttgctgaagc tgatcgaagg tacggtggct tcggtgccgc    2418

cgcagggtgg gcgtaagcat ccgcagcagg aattcctgca ggtcgatacc aagaacatcc    2478

tgttcatctg cggcggcgcg tttgccgggc tggacaaggt gatccaggcg cgttccaacg    2538

atgccggtgg tatcggcttc ggcgccaagg tcaagagcag cgagcgcaag caggaagtcg    2598

gcaagatcct ggccgaagtc                                                2618
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<213>       Xanthomonas campestris

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<222>       (1001)..(1576)

<400>       38
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caccaggcca gcctgcgaca acggcttgag gatcttgctg acggtgggcg cttccaggcc    180

ggcctgttcg gccagttcgc tcgcgctgag cacctggtcg ctccgtgcag ccagcaccgt    240

caagacaacg gtggcgtaat cggtcaattt ggtgacgcgc aacatgcgaa gacggtgaat    300

ccctaaagcg gaccgaaatt gtactctttt gctccgctca gtccaaccgc gcggttcagc    360

cgccggaaag gccagcccgt tgcggtggcc ggtgcgcttg tgcttggcgc gtgggcgcgc    420

tgcggtcaca atgagcggcc ccatcaccgg accctttcat gtcgcgcaaa gttgccgccc    480

gcaagtcacg tatccatggc aatggcgtgt cgccgtcgc tgcgctcagc aagggcgaac    540

gcatcatcca gtacaagggg cgcctgcgga cgcatgccga agtggatgcc gacgacaccg    600

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ccaactacga aggcaacatc gcgcgctgga tcaaccacag ctgcaatccc aattgcgaag    720

cggtgatcga agaggctgaa ggcgacgacc gcagcaagga caaggtcttc atcgaagcca    780
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gcaccatgtt gcagcccaag cgctgagcaa cggcgcgcgg cggtcggcat gacgcggcgc    960

gcacatcggt tcacggatgc gcaacacgcg cattcctagg gtg cag gct cct ttg    1015
                                            Val Gln Ala Pro Leu
                                            1               5

cag att gag gag ttc ctc atg acc cat tcg ctc tcc ggc aag acc gtt    1063
Gln Ile Glu Glu Phe Leu Met Thr His Ser Leu Ser Gly Lys Thr Val
                    10              15                  20

gcc gtg ctc gcg acc agt ggc ttc gaa caa tcc gag ctg cag gag ccc    1111
Ala Val Leu Ala Thr Ser Gly Phe Glu Gln Ser Glu Leu Gln Glu Pro
                25              30              35

aag cgc ttg ctg gaa tcc tgg ggc gcc acc gtc gag gtg atc gcg ccc    1159
Lys Arg Leu Leu Glu Ser Trp Gly Ala Thr Val Glu Val Ile Ala Pro
            40              45              50

ggc gac gat gca cag atc cgt ggc tgg aac cac acc gac tgg ggc gac    1207
Gly Asp Asp Ala Gln Ile Arg Gly Trp Asn His Thr Asp Trp Gly Asp
55              60              65

agc gtg ccg gtg gac acg ccc ctc gcg cag gcc aaa ccc gac cgc tac    1255
Ser Val Pro Val Asp Thr Pro Leu Ala Gln Ala Lys Pro Asp Arg Tyr
70              75              80              85

gac gcg ctc gtg ctg cca ggc ggt gtg atc aac ccg gac aac ctg cgc    1303
Asp Ala Leu Val Leu Pro Gly Gly Val Ile Asn Pro Asp Asn Leu Arg
                90              95              100

acc aac gcg cag gcg att gac ttc atc cgc agc gtt gcg gcc agc ggc    1351
Thr Asn Ala Gln Ala Ile Asp Phe Ile Arg Ser Val Ala Ala Ser Gly
            105             110             115

aag ccg gtg gct gca atc tgc cac ggg ccg tgg ttg ctg gtg gaa agt    1399
Lys Pro Val Ala Ala Ile Cys His Gly Pro Trp Leu Leu Val Glu Ser
            120             125             130

ggg ctg gtg cgc gac cgc aag gtg acg tcg tgg ccg tcg gtc aag acc    1447
Gly Leu Val Arg Asp Arg Lys Val Thr Ser Trp Pro Ser Val Lys Thr
        135             140             145

gat ctg agc aac gcg ggc ggc cgc tgg gag gat gcc gag gtg gta gtg    1495
Asp Leu Ser Asn Ala Gly Gly Arg Trp Glu Asp Ala Glu Val Val Val
150             155             160             165

gat ggc cag ctg atc acc agc cgc aag ccg gac gat att cct gca ttc    1543
Asp Gly Gln Leu Ile Thr Ser Arg Lys Pro Asp Asp Ile Pro Ala Phe
                170             175             180

acc gat gcg gtt gcc aag gca ctg gct gcc tga ggtcacgcag cagctataaa    1596
Thr Asp Ala Val Ala Lys Ala Leu Ala Ala
            185             190
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agagagcccg gtgcatcgct gcgccgggct cttttaattt cacgttggca gatgcgcggt  1656

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atatcctggt tgaagttcac cgccagccgg ccgttctgga tcgccaccga ctccacctgc  1776

acattgccca tcacggccgc aatggcggga tcgatcttgt agatcggctc cttgcgtgcg  1836

tagtcggcca accacgcgtt gagcaactgg cgcgtgctgc tgtccaactt ggcaccggcg  1896

ttggcggggc ggaaatcatc gaccgttggc tggtcgagat aaaacccctg ctttgccgtg  1956

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gtggccaatg caaggtcgaa cgccatcttc aagcggtcgc caggtggcaa cgacagtgcc  2076

gggttgctga ccgtcatttc gatcagccca cccagcgcat cgtgcgtctg cgggaagcgc  2136

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tccggctcca ggtgcccggc gggctggttc aacagcaggc gcccccgat ggattcttcc    180

acctgcaaaa agcggccgtc acggaccacc acggtggcca cggtgacatc ggggtgccag   240

cgagtttctt gaagcgtcat cagtcactgg gtccaggaag tggcaggctg gagattgatc   300
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89

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gcgggcgcgg ggccaaatcg tccaatgctg agggcgcggg accgtataat ggccggatgc   540

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aatggcgtgc taacgccgtc tgaacatgcc tatccgatag ggttgtggaa atcccaaca   960

aaagccgcat attgttggca acagccgttc ggagttacca atg ttc agc aaa gac   1015
                                              Met Phe Ser Lys Asp
                                              1   5

cta gag caa acc atc ggc cag tgc tac aag cga gcc cgt gag gcg cgg   1063
Leu Glu Gln Thr Ile Gly Gln Cys Tyr Lys Arg Ala Arg Glu Ala Arg
              10   15   20

cat gaa ttc atg acc gtc gaa cac ctg ctg ctc tcg ctg ctg gac aac   1111
His Glu Phe Met Thr Val Glu His Leu Leu Leu Ser Leu Leu Asp Asn
              25   30   35

ccc tcc gcg caa gcc gtc ttg aag gcc tgc ggt gcg gac cag gtg cgt   1159
Pro Ser Ala Gln Ala Val Leu Lys Ala Cys Gly Ala Asp Gln Val Arg
          40   45   50

ctg cac act gac ctg gaa cag gcg atc gag gcc tcg gtc tcg cgc ctg   1207
Leu His Thr Asp Leu Glu Gln Ala Ile Glu Ala Ser Val Ser Arg Leu
      55   60   65

gcc gag gac gat ggc cgc gac acg cag ccc acc ctg ggc ttc cag cgc   1255
Ala Glu Asp Asp Gly Arg Asp Thr Gln Pro Thr Leu Gly Phe Gln Arg
70   75   80   85

gtg ctg caa cgc gcc gtc tac cac gtg cag tcc tcc ggc aag aag gag   1303
Val Leu Gln Arg Ala Val Tyr His Val Gln Ser Ser Gly Lys Lys Glu
              90   95   100

gtc acc ggc gcc aat gtg ttg gtg gcg atc ttc ggc gaa aaa gac tca   1351
Val Thr Gly Ala Asn Val Leu Val Ala Ile Phe Gly Glu Lys Asp Ser
              105   110   115

cat gcg gtg tac ttc ctg aat cag cag gac atc acc cgc ctg gat atc   1399
His Ala Val Tyr Phe Leu Asn Gln Gln Asp Ile Thr Arg Leu Asp Ile
              120   125   130

90

```
gtc aat tac ctc tcc cac ggc atc gcc aag ctg ggt gaa gac ggc gag      1447
Val Asn Tyr Leu Ser His Gly Ile Ala Lys Leu Gly Glu Asp Gly Glu
    135                 140                 145

cag ccg tcc gcc tcc gat ggt gag ccc aag agc gat gcg ggc gag ggc      1495
Gln Pro Ser Ala Ser Asp Gly Glu Pro Lys Ser Asp Ala Gly Glu Gly
150                 155                 160                 165

gaa ggc aag ggc gat gcc ttg gcc gag tac gcc acc aac ctg aac gat      1543
Glu Gly Lys Gly Asp Ala Leu Ala Glu Tyr Ala Thr Asn Leu Asn Asp
                    170                 175                 180

cat gcc cgc aac ggc aag atc gac ccg ctc gtc ggg cgt gcg gac gag      1591
His Ala Arg Asn Gly Lys Ile Asp Pro Leu Val Gly Arg Ala Asp Glu
                185                 190                 195

atc gaa cgc acc atc cag gtc ctg tgc cgc cgc cgc aag aac aac ccg      1639
Ile Glu Arg Thr Ile Gln Val Leu Cys Arg Arg Arg Lys Asn Asn Pro
        200                 205                 210

ctg tac gtg ggc gag gcc ggc gtg ggc aag acc gcg atc gcc gaa ggc      1687
Leu Tyr Val Gly Glu Ala Gly Val Gly Lys Thr Ala Ile Ala Glu Gly
    215                 220                 225

ctg gcc aag cgc atc gtc gat gcc gac gtg ccg gaa gtg ctg gct gac      1735
Leu Ala Lys Arg Ile Val Asp Ala Asp Val Pro Glu Val Leu Ala Asp
230                 235                 240                 245

gcg gtg atc ttc tcg ctc gac ctc ggc gca ctg gtc gct ggc acc aag      1783
Ala Val Ile Phe Ser Leu Asp Leu Gly Ala Leu Val Ala Gly Thr Lys
                250                 255                 260

tac cgc ggc gac ttc gaa aag cgt ctc aag ggc gtg ctg acg gcg ctg      1831
Tyr Arg Gly Asp Phe Glu Lys Arg Leu Lys Gly Val Leu Thr Ala Leu
                265                 270                 275

aag aag gtg ccg aac gcg gtg ctg ttc atc gac gag atc cac acc atc      1879
Lys Lys Val Pro Asn Ala Val Leu Phe Ile Asp Glu Ile His Thr Ile
            280                 285                 290

atc ggt gcg ggc tcg gcg tcg ggc ggc acc atg gac gcc tcc aac ctg      1927
Ile Gly Ala Gly Ser Ala Ser Gly Gly Thr Met Asp Ala Ser Asn Leu
    295                 300                 305

atc aag ccg gcc ctg gcg tcg ggc gag ctg cgc tgc atc ggc tcg acc      1975
Ile Lys Pro Ala Leu Ala Ser Gly Glu Leu Arg Cys Ile Gly Ser Thr
310                 315                 320                 325

acg ttc cag gaa tac cgc ggc atc ttc gag aag gac cgt gcc ctg gca      2023
Thr Phe Gln Glu Tyr Arg Gly Ile Phe Glu Lys Asp Arg Ala Leu Ala
                330                 335                 340

cgc cgc ttc cag aag atc gac att gtc gag ccg acc gtc ggt gaa acc      2071
Arg Arg Phe Gln Lys Ile Asp Ile Val Glu Pro Thr Val Gly Glu Thr
                345                 350                 355
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91

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ttc gaa atc ctg cag ggc ctc aag ccc aag tac gaa gcg cat cac ggc    2119
Phe Glu Ile Leu Gln Gly Leu Lys Pro Lys Tyr Glu Ala His His Gly
        360                 365                 370

gtg acc tat gcc gac gac gcg ttg cag gcg gcg gtg gat ctg tcg gtc    2167
Val Thr Tyr Ala Asp Asp Ala Leu Gln Ala Ala Val Asp Leu Ser Val
        375                 380                 385

aag cac atc ggc gac cgt ctg ctg ccg gac aag gcg atc gac gtg atc    2215
Lys His Ile Gly Asp Arg Leu Leu Pro Asp Lys Ala Ile Asp Val Ile
390                 395                 400                 405

gac gaa gcc ggt gcg cgc cag cgt ctg ttg ccc gaa ggg cag cgc aag    2263
Asp Glu Ala Gly Ala Arg Gln Arg Leu Leu Pro Glu Gly Gln Arg Lys
                410                 415                 420

gag ctc atc gac atc gag gag atc gag acc atc gtg gcc caa gat ggc    2311
Glu Leu Ile Asp Ile Glu Glu Ile Glu Thr Ile Val Ala Gln Asp Gly
                425                 430                 435

gcg tat tcc ggc caa gca ggt cag cgc gac cga caa gga cgt gct gca    2359
Ala Tyr Ser Gly Gln Ala Gly Gln Arg Asp Arg Gln Gly Arg Ala Ala
            440                 445                 450

gca tct gga acg caa tct caa gat ggt gat ctt cgg gca gaa ccc ggc    2407
Ala Ser Gly Thr Gln Ser Gln Asp Gly Asp Leu Arg Ala Glu Pro Gly
        455                 460                 465

gat cga aac gct ggc tgg ctc gat caa gct ggc gcg ctc ggg cct ggc    2455
Asp Arg Asn Ala Gly Trp Leu Asp Gln Ala Gly Ala Leu Gly Pro Gly
470                 475                 480                 485

caa tcc gga gaa gcc gat cgg caa ctt cct gtt cgc tgg ccc gac cgg    2503
Gln Ser Gly Glu Ala Asp Arg Gln Leu Pro Val Arg Trp Pro Asp Arg
                490                 495                 500

tgt ggg caa gac cga ggt cac caa gca gct cgc gct gca att ggg cat    2551
Cys Gly Gln Asp Arg Gly His Gln Ala Ala Arg Ala Ala Ile Gly His
            505                 510                 515

cga gct ggt gcg gtt cga cat gtc cga gta cat gga agc gca ttc gat    2599
Arg Ala Gly Ala Val Arg His Val Arg Val His Gly Ser Ala Phe Asp
        520                 525                 530

cag ccg tct gat cgg tgc gcc tcc ggg cta tgt cgg ttt cga tca ggg    2647
Gln Pro Ser Asp Arg Cys Ala Ser Gly Leu Cys Arg Phe Arg Ser Gly
        535                 540                 545

cgg tct gct gac cga aaa gat cgt caa gac gcc gca ctg cgt gct gct    2695
Arg Ser Ala Asp Arg Lys Asp Arg Gln Asp Ala Ala Leu Arg Ala Ala
550                 555                 560                 565

gct gga cga ggt gga gaa ggc gca tcc gga cat ctt caa cat cct gtt    2743
Ala Gly Arg Gly Gly Glu Gly Ala Ser Gly His Leu Gln His Pro Val
                570                 575                 580

gca ggt cat gga ccg cgg cat cct cac cga tac caa cgg gcg cga agc    2791
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92

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      Ala Gly His Gly Pro Arg His Pro His Arg Tyr Gln Arg Ala Arg Ser
                  585                 590                 595

      gaa ctt caa gaa cgt gat cct ggt gat gac gac caa cgc cgg tgc cac    2839
      Glu Leu Gln Glu Arg Asp Pro Gly Asp Asp Asp Gln Arg Arg Cys His
                  600                 605                 610

      gca ggc ctc gcg tcg ttc gat cgg ttt cac caa gca gga tca ttc cac    2887
      Ala Gly Leu Ala Ser Phe Asp Arg Phe His Gln Ala Gly Ser Phe His
                  615                 620                 625

      cga tgc gat gga atc gat ccg ccg cgg ttt cac gcc gga gtt ccg caa    2935
      Arg Cys Asp Gly Ile Asp Pro Pro Arg Phe His Ala Gly Val Pro Gln
      630                 635                 640                 645

      ccg tct gga tgc gat cgt gca gtt cca gcc gct ggg ctt tga            2977
      Pro Ser Gly Cys Asp Arg Ala Val Pro Ala Ala Gly Leu
                          650                 655
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      ccacatcctg cgggtggtgg acaagttcat catcgagctg gaaatgctgt tgcaggaaaa    3037

      gcacgtgtcg ctgtcggcca cgccgaccgc gcgcgactgg ctggcccagc atggcttcga    3097

      tccgctgatg ggtgcgcgcc cgatgtcgcg cgtgatccag gagaagatca agcgcccgct    3157

      ggccgacgag ttgctgttcg gcaagctggt ggaaggtggc cgcgtcaata tcgacgtcaa    3217

      ggatggcgag ctggtggtcg aagcgcatcc ggaaccggag cgcctgttgc cggctacggt    3277

      tgattgatcg ttgcgattgg tcgctgctag agaaaaagcc gctcgaaaga gcggcttttt    3337

      tgtgttgaag gcgctggagc tggagcggca ccggtctggc gtactgctgg agcgttgggg    3397

      cgggtgccgg cgcatcacgg gtgcccaagt ccgggaggat cgccgtaaac caccgagacg    3457

      ccatgcgctt cttacaaccc cgagccgcgc tgcagtggtc gaacaatcac atgatctgcg    3517

      ggtgcatcac gaagctgtgc tatcggccgc cgaaaacgtc aacgcacaga tcagcgcgca    3577

      ggcgaaagcc tgcccatgta acgcgaccgc acgggcagaa aataaacccc aggcacgaca    3637

      aaaagcggca cttggccgct cgcgtcttg ataccagaac cgcttacttc atgcggtagg    3697

      taatacgacc cttggtgagg tcgtacggtg tcatctcaac tttgacacgg tcgccggtga    3757

      ggatgcgaat gtagttcttg cgcatacggc cggagatgtg ggcgatgatt tcatgcccgt    3817

      tttccagctt gatccggaac gtggtgttgg ggagcgtctc gctgacgctg ccttcgaatt    3877

      caatggagtc gtctttcgac atgtaatcct gtgcaatcac ggttggcccg gcagggccgt    3937

      aagggacagc attttacgcc ccatctcgcc gaggcgcaaa                          3977
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93

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accggcgcca atgtgttggt ggcgatcttc ggcgaaaaag actcacatgc ggtgtacttc      60

ctgaatcagc aggacatcac ccgcctggat atcgtcaatt acctctccca cggcatcgcc     120

aagctgggtg aagacggcga gcagccgtcc gcctccgatg gtgagcccaa gagcgatgcg     180

ggcgagggcg aaggcaaggg cgatgccttg gccgagtacg ccaccaacct gaacgatcat     240

gcccgcaacg gcaagatcga cccgctcgtc gggcgtgcgg acgagatcga acgcaccatc     300

caggtcctgt gccgccgccg caagaacaac ccgctgtacg tgggcgaggc cggcgtgggc     360

aagaccgcga tcgccgaagg cctggccaag cgcatcgtcg atgccgacgt gccggaagtg     420

ctggctgacg cggtgatctt ctcgctcgac ctcggcgcac tggtcgctgg caccaagtac     480

cgcggcgact tcgaaaagcg tctcaagggc gtgctgacgg cgctgaagaa ggtgccgaac     540

gcggtgctgt tcatcgacga gatccacacc atcatcggtg cgggctcggc gtcgggcggc     600

accatggacg cctccaacct gatcaagccg ccctggcgt cgggcgagct cgctgcatc     660

ggctcgacca cgttccagga ataccgcggc atcttcgaga aggaccgtgc cctggcacgc     720

cgcttccaga agatcgacat tgtcgagccg accgtcggtg aaaccttcga atcctgcag     780

ggcctcaagc ccaagtacga agcgcatcac ggcgtgacct atgccgacga cgcgttgcag     840

gcggcggtgg atctgtcggt caagcacatc ggcgaccgtc tgctgccgga caaggcgatc     900

gacgtgatcg acgaagccgg tgcgcgccag cgtctgttgc ccgaagggca gcgcaaggag     960
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ctcatcgaca tcgaggagat cgagaccatc gtggcccaag atg gcg cgt att ccg     1015
                                           Met Ala Arg Ile Pro
                                           1               5

gcc aag cag gtc agc gcg acc gac aag gac gtg ctg cag cat ctg gaa     1063
Ala Lys Gln Val Ser Ala Thr Asp Lys Asp Val Leu Gln His Leu Glu
              10              15              20

cgc aat ctc aag atg gtg atc ttc ggg cag aac ccg gcg atc gaa acg     1111
Arg Asn Leu Lys Met Val Ile Phe Gly Gln Asn Pro Ala Ile Glu Thr
          25              30              35

ctg gct ggc tcg atc aag ctg gcg cgc tcg ggc ctg gcc aat ccg gag     1159
Leu Ala Gly Ser Ile Lys Leu Ala Arg Ser Gly Leu Ala Asn Pro Glu
      40              45              50

aag ccg atc ggc aac ttc ctg ttc gct ggc ccg acc ggt gtg ggc aag     1207
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94

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Lys Pro Ile Gly Asn Phe Leu Phe Ala Gly Pro Thr Gly Val Gly Lys
    55                  60                  65

acc gag gtc acc aag cag ctc gcg ctg caa ttg ggc atc gag ctg gtg      1255
Thr Glu Val Thr Lys Gln Leu Ala Leu Gln Leu Gly Ile Glu Leu Val
70                  75                  80                  85

cgg ttc gac atg tcc gag tac atg gaa gcg cat tcg atc agc cgt ctg      1303
Arg Phe Asp Met Ser Glu Tyr Met Glu Ala His Ser Ile Ser Arg Leu
                90                  95                  100

atc ggt gcg cct ccg ggc tat gtc ggt ttc gat cag ggc ggt ctg ctg      1351
Ile Gly Ala Pro Pro Gly Tyr Val Gly Phe Asp Gln Gly Gly Leu Leu
                105                 110                 115

acc gaa aag atc gtc aag acg ccg cac tgc gtg ctg ctg ctg gac gag      1399
Thr Glu Lys Ile Val Lys Thr Pro His Cys Val Leu Leu Leu Asp Glu
            120                 125                 130

gtg gag aag gcg cat ccg gac atc ttc aac atc ctg ttg cag gtc atg      1447
Val Glu Lys Ala His Pro Asp Ile Phe Asn Ile Leu Leu Gln Val Met
        135                 140                 145

gac cgc ggc atc ctc acc gat acc aac ggg cgc gaa gcg aac ttc aag      1495
Asp Arg Gly Ile Leu Thr Asp Thr Asn Gly Arg Glu Ala Asn Phe Lys
150                 155                 160                 165

aac gtg atc ctg gtg atg acg acc aac gcc ggt gcc acg cag gcc tcg      1543
Asn Val Ile Leu Val Met Thr Thr Asn Ala Gly Ala Thr Gln Ala Ser
                170                 175                 180

cgt cgt tcg atc ggt ttc acc aag cag gat cat tcc acc gat gcg atg      1591
Arg Arg Ser Ile Gly Phe Thr Lys Gln Asp His Ser Thr Asp Ala Met
                185                 190                 195

gaa tcg atc cgc cgc ggt ttc acg ccg gag ttc cgc aac cgt ctg gat      1639
Glu Ser Ile Arg Arg Gly Phe Thr Pro Glu Phe Arg Asn Arg Leu Asp
            200                 205                 210

gcg atc gtg cag ttc cag ccg ctg ggc ttt gac cac atc ctg cgg gtg      1687
Ala Ile Val Gln Phe Gln Pro Leu Gly Phe Asp His Ile Leu Arg Val
        215                 220                 225

gtg gac aag ttc atc atc gag ctg gaa atg ctg ttg cag gaa aag cac      1735
Val Asp Lys Phe Ile Ile Glu Leu Glu Met Leu Leu Gln Glu Lys His
230                 235                 240                 245

gtg tcg ctg tcg gcc acg ccg acc gcg cgc gac tgg ctg gcc cag cat      1783
Val Ser Leu Ser Ala Thr Pro Thr Ala Arg Asp Trp Leu Ala Gln His
                250                 255                 260

ggc ttc gat ccg ctg atg ggt gcg cgc ccg atg tcg cgc gtg atc cag      1831
Gly Phe Asp Pro Leu Met Gly Ala Arg Pro Met Ser Arg Val Ile Gln
                265                 270                 275

gag aag atc aag cgc ccg ctg gcc gac gag ttg ctg ttc ggc aag ctg      1879
Glu Lys Ile Lys Arg Pro Leu Ala Asp Glu Leu Leu Phe Gly Lys Leu
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95

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        gtg gaa ggt ggc cgc gtc aat atc gac gtc aag gat ggc gag ctg gtg    1927
        Val Glu Gly Gly Arg Val Asn Ile Asp Val Lys Asp Gly Glu Leu Val
            295                 300                 305

        gtc gaa gcg cat ccg gaa ccg gag cgc ctg ttg ccg gct acg gtt gat    1975
        Val Glu Ala His Pro Glu Pro Glu Arg Leu Leu Pro Ala Thr Val Asp
        310                 315                 320                 325

        tga tcgttgcgat tggtcgctgc tagagaaaaa gccgctcgaa agagcggctt         2028

        ttttgtgttg aaggcgctgg agctggagcg gcaccggtct ggcgtactgc tggagcgttg   2088

        gggcgggtgc cggcgcatca cgggtgccca agtccgggag gatcgccgta aaccaccgag   2148

        acgccatgcg cttcttacaa ccccgagccg cgctgcagtg gtcgaacaat cacatgatct   2208

        gcgggtgcat cacgaagctg tgctatcggc cgccgaaaac gtcaacgcac agatcagcgc   2268

        gcaggcgaaa gcctgcccat gtaacgcgac cgcacgggca gaaaataaac cccaggcacg   2328

        acaaaaagcg gcacttggcc gcttcgcgtc ttgataccag aaccgcttac ttcatgcggt   2388

        aggtaatacg acccttggtg aggtcgtacg gtgtcatctc aactttgaca cggtcgccgg   2448

        tgaggatgcg aatgtagttc ttgcgcatac ggccggagat gtgggcgatg atttcatgcc   2508

        cgttttccag cttgatccgg aacgtggtgt tggggagcgt ctcgctgacg ctgccttcga   2568

        attcaatgga gtcgtctttc gacatgtaat cctgtgcaat cacggttggc ccggcagggc   2628

        cgtaagggac agcattttac gccccatctc gccgaggcgc aaattttatg ttaagcggac   2688

        tcctgcaagc ccgcttgcgt gccgttcgcc atagcgttgc gcccagctgc caggtggctc   2748

        tggcaatgcg acctgggtgg ctacatgctg caggaactgc tcgcgtggca ggcgttgggc   2808

        gcccaggcgc atcaggtgcg ggttttctat ctgcgcatcg atcagcggcc agccgcggcc   2868

        atgcagctcg cggcgagcg ctgccagtgc aatcttggag ccgccactgg cgccactgaa    2928

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gtgcggccgc cgaagccgcc gcgcaggcca agcgcggcaa aaccgatcgc ccggaacgcc    180

ccggcaagac tccgcccaag gtcgtggcca acgcaccggc gccaaaggtc ggtggcctga    240

gttggccggt gtcgggcaat ctgctggcgc gcttcaacgc cacgctgccg gatggccata    300

ccagcaaggg cgtgctgatc ggcgcgccca agggcagcac ggtcaccgcg gtggccgatg    360

gcacggtggt gtttccgac tggatgaccg gctacggcat gatcctgatc gtggatcacg    420

gcaatggcta catgagcctg tacgcgcaca acgacacctt gctgcgcgat ccggcgcca    480

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cgcagcagat ctcatcgcgc agccttgccg gtgcttcgca catacgccgg cgttgacggc    780

gattcaacgc ggatttaccg ctgcttcgcg cataatccag ccagcgccgc gctgtggggc    840

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ggccctgttc gcgtcgcccg gttgggcaca gcaggccagc cccgctgccg caccggccac    960

cgcggacgac ccggaagcca acgaagccgc cgtctccaag gtg ccg ctg gac gag   1015
                                             Val Pro Leu Asp Glu
                                              1               5

atc cgc cgc ttc gtg gcc gtg tac aac gcg gtc aag cag gcc tac gtg   1063
Ile Arg Arg Phe Val Ala Val Tyr Asn Ala Val Lys Gln Ala Tyr Val
                10              15                  20

gac ccg gtc gag gac aag aag ctg atg cat gcg gcc gtg cgc ggc ctg   1111
Asp Pro Val Glu Asp Lys Lys Leu Met His Ala Ala Val Arg Gly Leu
            25                  30                  35

ctg tcg gac ctg gat cca cac agc acc tac ttc gac aag gaa gat gcc   1159
Leu Ser Asp Leu Asp Pro His Ser Thr Tyr Phe Asp Lys Glu Asp Ala
            40                  45                  50

gag gcc ttc gac gaa cag gcc acc ggc gcc tat gac ggc atc ggc gtg   1207
Glu Ala Phe Asp Glu Gln Ala Thr Gly Ala Tyr Asp Gly Ile Gly Val
        55                  60                  65

gaa ctg ctg cag cag cag gac aac acg ctc aag gtg att gcg ccg atc   1255
Glu Leu Leu Gln Gln Gln Asp Asn Thr Leu Lys Val Ile Ala Pro Ile
70                  75                  80                  85

gac gac acg ccg gct gca cgc gcc ggg gtc aag gcg ggc gat gtg atc   1303
Asp Asp Thr Pro Ala Ala Arg Ala Gly Val Lys Ala Gly Asp Val Ile
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97

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gtg gcc atc gac ggc aag ccg atc gac gcc agc aag gca atg gag ccg    1351
Val Ala Ile Asp Gly Lys Pro Ile Asp Ala Ser Lys Ala Met Glu Pro
            105                 110                 115

ctg cgc ggc gaa tcc ggc agc aag gtc acc ctg acc atc gtg cgt gac    1399
Leu Arg Gly Glu Ser Gly Ser Lys Val Thr Leu Thr Ile Val Arg Asp
            120                 125                 130

aaa gtc gcc aag ccg ttc gac atc acc ctg cag cgc gaa acc att cgc    1447
Lys Val Ala Lys Pro Phe Asp Ile Thr Leu Gln Arg Glu Thr Ile Arg
    135                 140                 145

gtg gcc agc gtg cgc agc aag ctg ctc gaa ccc ggc tat ggc tac atc    1495
Val Ala Ser Val Arg Ser Lys Leu Leu Glu Pro Gly Tyr Gly Tyr Ile
150                 155                 160                 165

cgc atc agc acc ttc cag gcc gac acc ggc gcc gac ttc cag aag aac    1543
Arg Ile Ser Thr Phe Gln Ala Asp Thr Gly Ala Asp Phe Gln Lys Asn
            170                 175                 180

ctc aag caa ctg cag gcc ggc ggc aag ctg cgt ggc ctg gtg ctg gac    1591
Leu Lys Gln Leu Gln Ala Gly Gly Lys Leu Arg Gly Leu Val Leu Asp
            185                 190                 195

ctg cgc agc aac ccg ggc ggc ctg ctg acc tcg gcc gtg cag gtg gcc    1639
Leu Arg Ser Asn Pro Gly Gly Leu Leu Thr Ser Ala Val Gln Val Ala
            200                 205                 210

gac gat ctg ctc gac aag ggc aac atc gtc agc acc cgc ggg cgc atc    1687
Asp Asp Leu Leu Asp Lys Gly Asn Ile Val Ser Thr Arg Gly Arg Ile
            215                 220                 225

tcc atc agc gac gcc aag ttc gac gca acc ccg ggc gac ctg ctc ggc    1735
Ser Ile Ser Asp Ala Lys Phe Asp Ala Thr Pro Gly Asp Leu Leu Gly
230                 235                 240                 245

ggt gcg ccg gtg gtg gtg ctg gtg gac gcc ggc tcg gca agc gcg tcg    1783
Gly Ala Pro Val Val Val Leu Val Asp Ala Gly Ser Ala Ser Ala Ser
            250                 255                 260

gaa gtg ttg gcc ggc gcg ctg cgc gac aac cag cgc gcg cgc atc atc    1831
Glu Val Leu Ala Gly Ala Leu Arg Asp Asn Gln Arg Ala Arg Ile Ile
            265                 270                 275

ggc agc cgc acc ttc ggc aag ggc tcg gtg cag acc gtg ttg ccg ctg    1879
Gly Ser Arg Thr Phe Gly Lys Gly Ser Val Gln Thr Val Leu Pro Leu
            280                 285                 290

gac aac ggc gac tcg gtc aag ctc acc acc gcg cgc tat tac acg ccc    1927
Asp Asn Gly Asp Ser Val Lys Leu Thr Thr Ala Arg Tyr Tyr Thr Pro
            295                 300                 305

agt ggc aag tcg atc cag gcc agc ggc atc gtg ccc gaa gtg atg ctc    1975
Ser Gly Lys Ser Ile Gln Ala Ser Gly Ile Val Pro Glu Val Met Leu
310                 315                 320                 325
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acc ccc gaa ccg cag ccg ggc gac gcc gac gtg ccg gcc agc ctc acc    2023
Thr Pro Glu Pro Gln Pro Gly Asp Ala Asp Val Pro Ala Ser Leu Thr
                330             335             340

gac ttc agt gag gcg acc ctg ccg ggc cac ctg cgc ggc gat gca gaa    2071
Asp Phe Ser Glu Ala Thr Leu Pro Gly His Leu Arg Gly Asp Ala Glu
                345             350             355

ggc gag gag ggc tat agc gcc ggc gac gtg ctg ccg ggc gat ggc ccg    2119
Gly Glu Glu Gly Tyr Ser Ala Gly Asp Val Leu Pro Gly Asp Gly Pro
            360             365             370

atc aac gag gcg ctg gcc gaa ctc aag caa cct ggc tca gtc gcc aag    2167
Ile Asn Glu Ala Leu Ala Glu Leu Lys Gln Pro Gly Ser Val Ala Lys
        375             380             385

gca cag gcc gcg cgc aag gcc aag gcg caa gcg caa aag ccc aag gcc    2215
Ala Gln Ala Ala Arg Lys Ala Lys Ala Gln Ala Gln Lys Pro Lys Ala
390             395             400             405

atc aag cca acg ccc gag ccc aag ccg gcc gca cca cgc ccg ccc gcc    2263
Ile Lys Pro Thr Pro Glu Pro Lys Pro Ala Ala Pro Arg Pro Pro Ala
                410             415             420

agc gag cag acc acg ccg gcc gag ccg acg gac aag gcc aag cca gcg    2311
Ser Glu Gln Thr Thr Pro Ala Glu Pro Thr Asp Lys Ala Lys Pro Ala
            425             430             435

gcg cca gta ccg gca gct gtg ccg gcc gag ccg gtc aag taa           2353
Ala Pro Val Pro Ala Ala Val Pro Ala Glu Pro Val Lys
        440             445             450

agggcagtgc tgcgggtgcc acgtgcaccc gcagtgcgca gccggcgctg gtgtgcatgc   2413

gcacgtcgtg cgttgtaagt cgtgccgcga atttacatgc agcagttgtt agccacgcat   2473

gcggtgattg gacgcagacg ttgcggaata gaggcacgtc tcgtaggcat cgccggtcgc   2533

caggcgacgg ctatttgctt tgaaaaactc tctgcaagat gtcggcgctt tttcgcaggt   2593

ggtcttccac gtttggtcgc actcacttgc tgatgtgcgc gatacgtagg gactccgcgc   2653

actgcacgtc attaaacgtg tagaacgtct ttagcacgtc ttcgccagca gcctagacgc   2713

tgggcgaggg cacctagcct aagcactctc ccagcgacgc agttgcgcgt tgaggttgcg   2773

cgttgaaaac accacttcat cactaacgat gctctgccgg cttttttgcgg gtgccgcgct  2833

gctcgatgca gtgattcgcg ctcaccacct aagctgggtg acatggaatg cacgcactgc   2893

atatcgcgcg aatgcgtcac caaaatcgat gcgcagcgca gcagcacgac cagtccggat   2953

aacgcaggcc gcaggtgcgc gtgatgcgtg ccacgctgcc accaatacgg cgggttgaaa   3013

acctggccgt tgtgtcggtc atgcgtgctc cctgcacgtc attgcaggtg gccagcaaga   3073
```

99

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catgcggtcg tgcctcttgg gcgcactgtg catcgcagga ccacgacgcg tccttgcggg    3133

aagccgcatg gacacatacg gacttgttgc agctgttttc gctacatcgt tctagaagag    3193

caggtgatga caacccgttc gcgcatcaga catcggcagc ggcagcgcag cagcaatccg    3253

caacgcaacc acgcaacatc acaccctaac gcgcaaccag caacgcctcg gggttgacca    3313

gattgcgcgg tgtgccagca gcgaacgcca gcacgttgtc                          3353
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<212>   DNA
<213>   Xanthomonas campestris

<220>
<221>   CDS
<222>   (1001)..(3184)

<400>   42

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ttcatgatcc tgggtgaggt gtgcacgcgg cgctgctcgt tctgcgacgt ggcgcatggc    120

cggcccaagc cgccggatgc gagcgagccg accagtctgg ctaccaccgt ggccgacatg    180

ggcctgaagt atgtggtggt gaccagcgtg gaccgcgacg acctgcgcga cggcggtgcc    240

cagcacttcg tcgactgcat ctcggcgatc cgcgccagcg cgcccaagac ccggatcgag    300

atcctgaccc cggacttccg tggcaagggc cgcatggacc gcgcgctgga gatcctggcc    360

accagcccgc cggatgtgtt caaccacaac atcgaaaccg tgccggacct gtacccgaac    420

gtgcgccccg gtgccgatta ccagtggtcg ctgacgctgc tgcagcgctt caaggcgcag    480

cacccgacca tcgccaccaa gtccggcatc atgctcggcc tgggcgaaac gatggagcag    540

gtgcaggcca ccttgcgcga cctgcgcgcg cacgatgtgg acatgatcac gatcggccag    600

tacctgcagc ccacgccgca ccaccacccg gtgatgcgct actggacgcc ggaggaatac    660

aaggcgctgg aggactacgg caatgcgctg ggcttcagcc atgtggcgtc cggcccgatg    720

gtgcgttcct cgtaccacgc cgaccgtcag gctgccggtg ccggcgtcgc cgcctgagcc    780

caaccgcatc ggtgtgtgca tcacggccct cgcagtgcg cggggccgtg tcgtatccgg    840

gccagcgtgc caagggtacg ggcgcgttca caatctgcta catgcccgga ctaggctga    900

ttcagccagc ggatgacaac gccagcaact ttcggcactg tcatgctgtc acatccgatc    960

accgcccttc tttcatcggc cccgtgccga gagccattcg atg acc tac aac gtt     1015
                                               Met Thr Tyr Asn Val
                                               1               5
```

100

```
tct gcg tcc ctg aag gcc ggc ctg ctg gca ctg gtg ctc acc act ccg    1063
Ser Ala Ser Leu Lys Ala Gly Leu Leu Ala Leu Val Leu Thr Thr Pro
            10                  15                  20

atg gca ttg ctg gcg cgt gcg gac acg gcg ctg cct gcc gcg gcc acg    1111
Met Ala Leu Leu Ala Arg Ala Asp Thr Ala Leu Pro Ala Ala Ala Thr
            25                  30                  35

ccc gaa cag gcg acg gcg acc aaa ctg gtc tac ggg ctg ctc tcg gac    1159
Pro Glu Gln Ala Thr Ala Thr Lys Leu Val Tyr Gly Leu Leu Ser Asp
            40                  45                  50

agc cgg tat gcg tac cgc ccg cgt acc ctc gac gag gcg atg tcc aag    1207
Ser Arg Tyr Ala Tyr Arg Pro Arg Thr Leu Asp Glu Ala Met Ser Lys
            55                  60                  65

gac gtc ttc aag cgg tat ctg gag aca ctg gac ggc ggc aag caa ttc    1255
Asp Val Phe Lys Arg Tyr Leu Glu Thr Leu Asp Gly Gly Lys Gln Phe
70                  75                  80                  85

ttc acc cag gcc gat gtg gat gcg ttc gcg ccg ctg cag gcg ggc gtg    1303
Phe Thr Gln Ala Asp Val Asp Ala Phe Ala Pro Leu Gln Ala Gly Val
                90                  95                  100

ggt gat gcg ctg cgc ggc ggc aac ctg gag ccg gcg ttc cag gtg ttc    1351
Gly Asp Ala Leu Arg Gly Gly Asn Leu Glu Pro Ala Phe Gln Val Phe
            105                 110                 115

tcg gtc tac aag aag cgt gtc gat cag cgc gtc aaa tac gcg cgc gaa    1399
Ser Val Tyr Lys Lys Arg Val Asp Gln Arg Val Lys Tyr Ala Arg Glu
            120                 125                 130

ctg ctc aag cag gat ttc gat ttc acc ggc agc gag aag ttc gag tac    1447
Leu Leu Lys Gln Asp Phe Asp Phe Thr Gly Ser Glu Lys Phe Glu Tyr
            135                 140                 145

gac cgc aag gac gtg ccg tgg gca gcg gac gac aag cag ctg gac gtg    1495
Asp Arg Lys Asp Val Pro Trp Ala Ala Asp Asp Lys Gln Leu Asp Val
150                 155                 160                 165

ctg tgg cgg cag tcg gtg atg aac gac tgg ctg cgc ctg aag ctg gcc    1543
Leu Trp Arg Gln Ser Val Met Asn Asp Trp Leu Arg Leu Lys Leu Ala
                170                 175                 180

ggc aag aag tcg gac gac atc cgc aag acg ctg gac aag cgc tat gcc    1591
Gly Lys Lys Ser Asp Asp Ile Arg Lys Thr Leu Asp Lys Arg Tyr Ala
            185                 190                 195

acg ttg gcc gat tcg gtc aac gaa ctg aag gcc gag gac gcg ttc cag    1639
Thr Leu Ala Asp Ser Val Asn Glu Leu Lys Ala Glu Asp Ala Phe Gln
            200                 205                 210

ttc ttc ctc aac gcc tac acc aat gcg gtt gac ccg cac acc gat tac    1687
Phe Phe Leu Asn Ala Tyr Thr Asn Ala Val Asp Pro His Thr Asp Tyr
            215                 220                 225
```

101

```
ttc act ccg cgc acc gcc gag aac ttc aac cag cag atg tcg ctg tcg      1735
Phe Thr Pro Arg Thr Ala Glu Asn Phe Asn Gln Gln Met Ser Leu Ser
230             235                 240                 245

ctg gaa ggc atc ggc gcg cag ctg cag aag cag gac gac atg gtg gtg      1783
Leu Glu Gly Ile Gly Ala Gln Leu Gln Lys Gln Asp Asp Met Val Val
            250                 255                 260

atc cgc gag gtg atc ccg ggt ggt ccg gct gcg gtg gac ggc acg ctc      1831
Ile Arg Glu Val Ile Pro Gly Gly Pro Ala Ala Val Asp Gly Thr Leu
            265                 270                 275

aag ccg ggt gac cgc atc gtt ggc gtc ggc cag acc aag agc ggc gcc      1879
Lys Pro Gly Asp Arg Ile Val Gly Val Gly Gln Thr Lys Ser Gly Ala
            280                 285                 290

atc gaa gat gtg atc ggc tgg cgc atc gac gac gtg gtg gcc aag atc      1927
Ile Glu Asp Val Ile Gly Trp Arg Ile Asp Asp Val Val Ala Lys Ile
            295                 300                 305

cgc ggc agc aag gac acc cag gtg cgc ctg gag tac atc ccg gcc gag      1975
Arg Gly Ser Lys Asp Thr Gln Val Arg Leu Glu Tyr Ile Pro Ala Glu
310                 315                 320                 325

ctg ggc atc gac ggc acg cac cgc acc gtg acc ctg acg cgg cag aag      2023
Leu Gly Ile Asp Gly Thr His Arg Thr Val Thr Leu Thr Arg Gln Lys
            330                 335                 340

gtg cgc ctg gcc gaa cag gcc gcc aag ggc gag acc atc acg ctg ccg      2071
Val Arg Leu Ala Glu Gln Ala Ala Lys Gly Glu Thr Ile Thr Leu Pro
            345                 350                 355

gcc agt ggc gac gtg ccg cag cgc cgg atc ggc atc atc aaa ctg ccg      2119
Ala Ser Gly Asp Val Pro Gln Arg Arg Ile Gly Ile Ile Lys Leu Pro
            360                 365                 370

ggt ttc tac cag gat ttc gaa ggc cgt cgc cgt aac gcg gcc gac tat      2167
Gly Phe Tyr Gln Asp Phe Glu Gly Arg Arg Arg Asn Ala Ala Asp Tyr
            375                 380                 385

gcc tcg gcc acc cgc gat gtc gcc aag ctg ctg gcg ggt ttc aag tcc      2215
Ala Ser Ala Thr Arg Asp Val Ala Lys Leu Leu Ala Gly Phe Lys Ser
390                 395                 400                 405

gac aag gtc gac ggc gtg gtg ctg gat ctg cgc aac aac ggt ggc ggt      2263
Asp Lys Val Asp Gly Val Val Leu Asp Leu Arg Asn Asn Gly Gly Gly
            410                 415                 420

tcg ctg gac gaa gcg atc gag ctc acc ggg ctg ttc atc gag cag ggc      2311
Ser Leu Asp Glu Ala Ile Glu Leu Thr Gly Leu Phe Ile Glu Gln Gly
            425                 430                 435

ccg gtg gtg cag gtg cgc gaa tcc ggt ggc cgg gtc acc gtc aat ggc      2359
Pro Val Val Gln Val Arg Glu Ser Gly Gly Arg Val Thr Val Asn Gly
            440                 445                 450

gac agc aac ccg aag gtg gcc tgg gat ggt ccg ctg ggc gtg ctg atc      2407
```

102

```
        Asp Ser Asn Pro Lys Val Ala Trp Asp Gly Pro Leu Gly Val Leu Ile
            455                     460                 465

aac cgc ggt tcg gct tcg gcg tcg gaa att ttt gct ggt gcc atc cag    2455
Asn Arg Gly Ser Ala Ser Ala Ser Glu Ile Phe Ala Gly Ala Ile Gln
470                 475                 480                 485

gac tac ggc cgt ggc ctg gtc att ggt gaa acc acc ttc ggc aag ggc    2503
Asp Tyr Gly Arg Gly Leu Val Ile Gly Glu Thr Thr Phe Gly Lys Gly
                490                 495                 500

acg gtg cag aac att gtt gac ctg gac cgc tgg ccg gcc gcc gaa ggg    2551
Thr Val Gln Asn Ile Val Asp Leu Asp Arg Trp Pro Ala Ala Glu Gly
                505                 510                 515

cag cgt tat ggc cag gtc aag ctg acc atc gcg cag ttc ttc cgc gtc    2599
Gln Arg Tyr Gly Gln Val Lys Leu Thr Ile Ala Gln Phe Phe Arg Val
            520                 525                 530

agc ggc tcc agc acc cag cac aag ggc gtg gtg ccg gac atc gcc ttc    2647
Ser Gly Ser Ser Thr Gln His Lys Gly Val Val Pro Asp Ile Ala Phe
            535                 540                 545

ccg gcc agc gtg gat gcc acc gag ttc ggc gaa agc acc tac gac aac    2695
Pro Ala Ser Val Asp Ala Thr Glu Phe Gly Glu Ser Thr Tyr Asp Asn
550                 555                 560                 565

gca ctg ccg tgg acg cgc att gcc gcc gtg ccg cac acc cag tac ggc    2743
Ala Leu Pro Trp Thr Arg Ile Ala Ala Val Pro His Thr Gln Tyr Gly
                570                 575                 580

aac ttc gcc ccc ctg ctg ccg aag ctg cag acc ctg cac gcc acg cgc    2791
Asn Phe Ala Pro Leu Leu Pro Lys Leu Gln Thr Leu His Ala Thr Arg
                585                 590                 595

atc gcc agc gac aag gaa ttc cag tgg tgg gaa gag gac gtc aag cag    2839
Ile Ala Ser Asp Lys Glu Phe Gln Trp Trp Glu Glu Asp Val Lys Gln
            600                 605                 610

ttc cgt gac gag aag gcc aag aag tac att tcg ttg aac gaa gcc gag    2887
Phe Arg Asp Glu Lys Ala Lys Lys Tyr Ile Ser Leu Asn Glu Ala Glu
    615                 620                 625

cgc gtg gcc gaa cgg cag aag cag gat cag cag cgc aag gac cgc cag    2935
Arg Val Ala Glu Arg Gln Lys Gln Asp Gln Gln Arg Lys Asp Arg Gln
630                 635                 640                 645

cag gtg cgc aag cag ctg ggt ctg ccg ctg gac ccg ctg gcc gac gac    2983
Gln Val Arg Lys Gln Leu Gly Leu Pro Leu Asp Pro Leu Ala Asp Asp
                650                 655                 660

agc gac gac ggc ctg acc ggc aac gag cgt gac atc gtc aag gac acc    3031
Ser Asp Asp Gly Leu Thr Gly Asn Glu Arg Asp Ile Val Lys Asp Thr
                665                 670                 675

gca cgc gag aag gcc gct gaa aag cgt ccg gat ccg ctg ttg cac gaa    3079
Ala Arg Glu Lys Ala Ala Glu Lys Arg Pro Asp Pro Leu Leu His Glu
```

103

```
tcg gcg gcc atc ctg gcc gat gcg ctg ggg ttg ttg tcc aag gac cag   3127
Ser Ala Ala Ile Leu Ala Asp Ala Leu Gly Leu Leu Ser Lys Asp Gln
    695                     700                     705

ccg ctg tcg gcg cag gtg ctg ccg caa tcg acg gca ccg ggt cgc tgg   3175
Pro Leu Ser Ala Gln Val Leu Pro Gln Ser Thr Ala Pro Gly Arg Trp
710                     715                     720                725

gct gac tga ttgcttgcgt cattgatggg tgagcaacgc caccgcttgt           3224
Ala Asp

cggtggcgtt tgtttttggg gcgcatcggt tggtgacgtg tgcgcacccg actgcccgca   3284

gcagatcagg ccagcgcctg ccagcaggcc tgcaggccga gcagcagcaa ggtgccgaag   3344

aacacgcgcc ggaacatctc ggcggagata cgtcgccgca cccgggtgcc ggcccacacg   3404

cccagcgctg ttggcagcag cgccagtagc gatggcacgc cgccgatag cggcacgccg    3464

ccctgccaga ccagcgcgat ggccagggca agcgttgcgg taccaaaaca ggtggccagt   3524

gcgcggatca acagttcgcg tggtaacccc agcgcggcga aatacggcgc tatcggcagc   3584

actaccacgc cagtggcgcc gttgagcagg ccgctgatca ggccggtcaa tgggctggcc   3644

cagcgttcat ggcgtggtgg caacgtccac tgccagcggg aaagccccag caacgcataa   3704

gccaccaaca acacgccgag cgcggcacgc agggtgcgcg ggtcgccacc gatgatcaac   3764

ccggcagtta gccaggtgcc cacgctcatc agtgccagca ggggccatag tcgccgcaac   3824

agtgcacccg gtgccggccc ccaggcctgc tgcagattcg tcaccagcga aggcagcacc   3884

aacaacgcgg ctgcctggct gggtggcagc cacagctcga gcaggcccat ggccacggtc   3944

ggcaggccca tgccggccac acccttgacc ccgccagcca gcaggaacac gcccgcgatc   4004

aagagccagt gcaatgcatc gtcattcatg ccgggcagga tcctgccgcc ggggcgaggc   4064

ggcaagctgt ctttgtttga ggcagacttc gtccacaccg aaggctgggg ctgcgcgatg   4124

caagtggagt tcgtcgatct gcggattttc gtggcagtgg ccgacaccgg cagcatcacc   4184
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<213>   Xanthomonas campestris

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<222>   (1001)..(3412)

<400>   43

104

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cgccatcaat ctcgatgaag gcgatgcgct ggtgggtgtg gcgctgaccg atggcgaccg     120

cgatgtcctg ctgtttgctt ccaacggcaa gaccgtgcgc tttggcgagt cgaccgtgcg     180

ctcgatgggc cgtaccgcca ctggcgtgcg cggtatccgt ctggccaagg gcgaggaggt     240

ggtcagcctg atcgtttccg agcgtgccgg cggagtggaa gacgaggtcg aggacgagag     300

tgccgaggag gtcgtggaga ccaccgacgg cgccgagccg gcagtgatcg atgtcgccga     360

caacggcgat gtggcctaca tcctgaccgc caccgagaac gggtatggca gcgcacgcc      420

gctggccgaa tacccgcgca agggacgcgg cacgcaaggc gtgatcggta tccagaccac     480

cgagcgcaac ggcaagttgg tgcgtgcggt gctgctgggt ccaccgatg aagtgctgct      540

gatatccgat ggtggcacct ggtgcgcac gcgtggttcg agatttcgc gcgtgggccg      600

caacacccag ggcgtgacgc tgatccggct gtccaagggc gagaaactgc aggccgtcga     660

acgcctggat gcctcgctgg aagagcccga ggatgtggtg acgaggcgg ttgcaatcac      720

cagcgatgcg ccgcctgccg agggctgatc gcgcggtgcg atgtgtgcag tcatgaaaaa     780

cgccggcgca ttgccggcgt ttttttttgc ggtgtttggc tgtaacgcat tgttgacaga     840

acatgtcagc aaagaacgca ggtctttcac aaaaacgggt cgaaggtagt tcgcggtgcg     900

gcaacgttgc gttggccgca gatgcaaaga ggaactactg atgtcgacat gcttcgtcc      960

ctcccgtcgc ggccattggg ccctggcgat tctgggaggc gtg att gtg ctg ctg      1015
                                           Val Ile Val Leu Leu
                                            1               5

ggg ctg gtg ctg ctg gca ggt ggt gcg tgg ctc gcc acg ctg ggc gga     1063
Gly Leu Val Leu Leu Ala Gly Gly Ala Trp Leu Ala Thr Leu Gly Gly
              10              15              20

tcc tgg tat tac gca ccg gca ggc ctg gcg atg ctg atc gct ggc gtg     1111
Ser Trp Tyr Tyr Ala Pro Ala Gly Leu Ala Met Leu Ile Ala Gly Val
              25              30              35

ttg ctg ttc cgc ggc cgc aat gcc ggc gcg tgg tgg ttt gcc gcc gtc     1159
Leu Leu Phe Arg Gly Arg Asn Ala Gly Ala Trp Trp Phe Ala Ala Val
              40              45              50

gtg gcc gcc acg ctg ctg tgg acg tgg tgg gaa tcg ggc agt gat tac     1207
Val Ala Ala Thr Leu Leu Trp Thr Trp Trp Glu Ser Gly Ser Asp Tyr
              55              60              65

tgg cgc tgg gtg ccg cgg ctc ggg ttg atc gtg ggc ctg gcg ttt gtg     1255
Trp Arg Trp Val Pro Arg Leu Gly Leu Ile Val Gly Leu Ala Phe Val
70              75              80              85

ctg gcg ctg ctg ttg ccc aag ctc gag cgc ccg gtg tcg cgc gcc gtc     1303
```

105

```
Leu Ala Leu Leu Leu Pro Lys Leu Glu Arg Pro Val Ser Arg Ala Val
                90                95                100

tcg cgc agc gtg gct ggc gga ctg gca gtg gtg ttt gtg gtg gcc ttt    1351
Ser Arg Ser Val Ala Gly Gly Leu Ala Val Val Phe Val Val Ala Phe
            105                110                115

gcg ttg gcc ttc gtg ccg ttc gga atc acc gag gcc gag ggt gca ttg    1399
Ala Leu Ala Phe Val Pro Phe Gly Ile Thr Glu Ala Glu Gly Ala Leu
        120                125                130

acg cag gtg gca ggc atc gcc gca ggt gtg gtc aat cgc ccc gcc gat    1447
Thr Gln Val Ala Gly Ile Ala Ala Gly Val Val Asn Arg Pro Ala Asp
        135                140                145

ggc gca cag ccg gca cag ccc gcc aat gcg ccg gtc gat gac gac tgg    1495
Gly Ala Gln Pro Ala Gln Pro Ala Asn Ala Pro Val Asp Asp Asp Trp
150                155                160                165

gcc gca tat gga cgc agc cag gct ggg cag cgc tat tcg cca ctc acc    1543
Ala Ala Tyr Gly Arg Ser Gln Ala Gly Gln Arg Tyr Ser Pro Leu Thr
                170                175                180

caa atc aat cgc gac aat gtc agc cag ctg cag cag gcg tgg gtg ttc    1591
Gln Ile Asn Arg Asp Asn Val Ser Gln Leu Gln Gln Ala Trp Val Phe
                185                190                195

cat acc ggc gat gtg ccg acc aag cgc tgg ggc gcc gaa acc aca ccg    1639
His Thr Gly Asp Val Pro Thr Lys Arg Trp Gly Ala Glu Thr Thr Pro
            200                205                210

ttg aag gtc ggc gac agc ctg tat ctg tgt agc gcg cgc aat cag gtg    1687
Leu Lys Val Gly Asp Ser Leu Tyr Leu Cys Ser Ala Arg Asn Gln Val
        215                220                225

atc gcg ctg gac gcc tcc acc ggc aag cag cgc tgg cgc tac gac ccc    1735
Ile Ala Leu Asp Ala Ser Thr Gly Lys Gln Arg Trp Arg Tyr Asp Pro
230                235                240                245

aag gtc aag gac gag gcc att cca tac acc gcg gcc tgc cgc ggg gtg    1783
Lys Val Lys Asp Glu Ala Ile Pro Tyr Thr Ala Ala Cys Arg Gly Val
                250                255                260

tcg tat tac gaa gtg ccg acg gcg gcg ccg gcc gca aat gac gca gcc    1831
Ser Tyr Tyr Glu Val Pro Thr Ala Ala Pro Ala Ala Asn Asp Ala Ala
                265                270                275

gct tcg cag gcg gcg acg gcg cct gcg ctg tgc cgt acg cgc gtg atc    1879
Ala Ser Gln Ala Ala Thr Ala Pro Ala Leu Cys Arg Thr Arg Val Ile
            280                285                290

gaa ggc acg ctg gat ggg cgc ctg att gca ttg gat gcg cgc acc ggg    1927
Glu Gly Thr Leu Asp Gly Arg Leu Ile Ala Leu Asp Ala Arg Thr Gly
        295                300                305

aca cca tgc gcg gac ttc ggc act cac ggt cag gtc gac atc acc gtc    1975
Thr Pro Cys Ala Asp Phe Gly Thr His Gly Gln Val Asp Ile Thr Val
```

106

```
ggc atg ggc gag acg cca ccg ggc tac atc tcg atc aac tcg ccg ccg     2023
Gly Met Gly Glu Thr Pro Pro Gly Tyr Ile Ser Ile Asn Ser Pro Pro
                330                     335                 340

gcc atc gtg cgc ggc gtg gtg gtc atc ggg cat cag gtc ctt gac ggg     2071
Ala Ile Val Arg Gly Val Val Val Ile Gly His Gln Val Leu Asp Gly
            345                     350                 355

caa aag cgt tat gag ccc tcg ggc gtg atc cag ggc ttt gac gcg gtc     2119
Gln Lys Arg Tyr Glu Pro Ser Gly Val Ile Gln Gly Phe Asp Ala Val
            360                     365                 370

acc ggc cag ttg cgc tgg gcc tgg gac atg acc cat ccc gaa tgg aat     2167
Thr Gly Gln Leu Arg Trp Ala Trp Asp Met Thr His Pro Glu Trp Asn
            375                     380                 385

ggt gca ccg ccg cct ggc cag acc tgg acg cgc ggc acc ccc aac atg     2215
Gly Ala Pro Pro Pro Gly Gln Thr Trp Thr Arg Gly Thr Pro Asn Met
390                     395                     400                 405

tgg acc acc gca gcg gcc gac gag cag ctg ggt tac gtg tat ctg ccg     2263
Trp Thr Thr Ala Ala Ala Asp Glu Gln Leu Gly Tyr Val Tyr Leu Pro
                410                     415                 420

atg ggc aat tcc acc gcg gac tac tgg agc agc tcg cgc acg ccg ccg     2311
Met Gly Asn Ser Thr Ala Asp Tyr Trp Ser Ser Ser Arg Thr Pro Pro
                425                     430                 435

gaa aac cgc tat gcc acc tcg ctg gtg gcg ttg gat gtg acc acc ggc     2359
Glu Asn Arg Tyr Ala Thr Ser Leu Val Ala Leu Asp Val Thr Thr Gly
            440                     445                 450

aag ccg gtg tgg aat ttc cag acc acg cat atc gac gca tgg gat tac     2407
Lys Pro Val Trp Asn Phe Gln Thr Thr His Ile Asp Ala Trp Asp Tyr
            455                     460                 465

gac ctc ggc tcg cag ccc agc ctg atc gat ttc ccc aag gat ggc gtc     2455
Asp Leu Gly Ser Gln Pro Ser Leu Ile Asp Phe Pro Lys Asp Gly Val
470                     475                     480                 485

aac gtg ccg gcc gtg ttg ctg ccg agc aag cag ggc gag ttg tac gtg     2503
Asn Val Pro Ala Val Leu Leu Pro Ser Lys Gln Gly Glu Leu Tyr Val
                490                     495                 500

ctg gac cgt cgc acc ggc gag ccg ctg gtt ggc gtg gaa gag cgc gcc     2551
Leu Asp Arg Arg Thr Gly Glu Pro Leu Val Gly Val Glu Glu Arg Ala
            505                     510                 515

gtg ccc ggc ggt ggt gtg gag ccg cag atg cgc tac aag acc cag ccg     2599
Val Pro Gly Gly Gly Val Glu Pro Gln Met Arg Tyr Lys Thr Gln Pro
            520                     525                 530

ttc tcg ctg tat cac acg ctg cgc aag ccg gat ctg acc gag cgc gac     2647
Phe Ser Leu Tyr His Thr Leu Arg Lys Pro Asp Leu Thr Glu Arg Asp
            535                     540                 545
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atg tgg ggc atg acc ccg atc gat cag ctg gtg tgc cgt atc cag ttc    2695
Met Trp Gly Met Thr Pro Ile Asp Gln Leu Val Cys Arg Ile Gln Phe
550             555             560                 565

cgc aag gcg agc tac aag ggc atc tac acg ccg ccc gaa gcc gac cgg    2743
Arg Lys Ala Ser Tyr Lys Gly Ile Tyr Thr Pro Pro Glu Ala Asp Arg
                570             575             580

cat tcc atc gaa tac ccc ggc tat aac ggc ggc tcg gac tgg ggc agc    2791
His Ser Ile Glu Tyr Pro Gly Tyr Asn Gly Gly Ser Asp Trp Gly Ser
            585             590             595

gtg gcg gtg gat ccg cac cgt ggc gtg atc gtg gcc aac tac aac gac    2839
Val Ala Val Asp Pro His Arg Gly Val Ile Val Ala Asn Tyr Asn Asp
        600             605             610

atg ccc aac tac aac atc ctg gtg ccg cgc gcc aag gcg gac aaa ctg    2887
Met Pro Asn Tyr Asn Ile Leu Val Pro Arg Ala Lys Ala Asp Lys Leu
    615             620             625

ggc tgg gct ccg cgc gat cag gtg cgt ggc gat gcc ggt ggt gcc gaa    2935
Gly Trp Ala Pro Arg Asp Gln Val Arg Gly Asp Ala Gly Gly Ala Glu
630             635             640                 645

ggc gcc ggc gac ccg cag gcc ggc acg ccc tac gcg gta aac gtc aac    2983
Gly Ala Gly Asp Pro Gln Ala Gly Thr Pro Tyr Ala Val Asn Val Asn
                650             655             660

gcc ggc tgg cgt ttg ccg ttc acc aag ctg ctg tgc aag cag cca ccc    3031
Ala Gly Trp Arg Leu Pro Phe Thr Lys Leu Leu Cys Lys Gln Pro Pro
                665             670             675

tat ggc ggc att cgc gcc atc gat ctg aag agc ggc aag acc ctg tgg    3079
Tyr Gly Gly Ile Arg Ala Ile Asp Leu Lys Ser Gly Lys Thr Leu Trp
            680             685             690

gac cgt ccc ttt ggc agt gcg cgc ggc aac ggg ccg ttc ggg att cgc    3127
Asp Arg Pro Phe Gly Ser Ala Arg Gly Asn Gly Pro Phe Gly Ile Arg
    695             700             705

tcc ggc ctg ccg atc gaa atc ggc acg ccg aac aac ggt ggc tcg gtg    3175
Ser Gly Leu Pro Ile Glu Ile Gly Thr Pro Asn Asn Gly Gly Ser Val
710             715             720             725

gtc act gcg ggt ggt ctg atc ttc att gcc gcc gca acc gat gac ctg    3223
Val Thr Ala Gly Gly Leu Ile Phe Ile Ala Ala Ala Thr Asp Asp Leu
            730             735             740

atc cgt gcg atc gac ctg gcc acc ggc aag gag ctg tgg cac gcc aag    3271
Ile Arg Ala Ile Asp Leu Ala Thr Gly Lys Glu Leu Trp His Ala Lys
            745             750             755

ctg ccg gcc ggt ggc cag gcc aat ccg atg gtc tac gcg tac ggc ggc    3319
Leu Pro Ala Gly Gly Gln Ala Asn Pro Met Val Tyr Ala Tyr Gly Gly
    760             765             770
```

108

```
cgc gag tat ctg gtg atc atg gcg gcc ggt cac cac ttc atg gaa aca    3367
Arg Glu Tyr Leu Val Ile Met Ala Ala Gly His His Phe Met Glu Thr
    775                 780                 785

ccg gca ggc gat gcc ctg gtg gcc tac gcg ttg ccg cag cgg taa       3412
Pro Ala Gly Asp Ala Leu Val Ala Tyr Ala Leu Pro Gln Arg
790                 795                 800

gcggcaacgc ggttcaatgg atctgtgaat cagaaacgcg ccgcttgcgg cgcgtttctt  3472

tagcacgcat tcctcgcaac ccgtccagac tcgcagctcg aatagtcagc ccgagcgctc  3532

aattcaaggc acgatacgaa tggccggcgc gactgctttg taagaaagca aacgtcccac  3592

attccgcgcc gcacgcgcct caggcactca acccaggcac tcagttcaca gcacttgcaa  3652

gactgtcttg ctcttccttc acggcatcct gcacgtcctg cgccagcgtg gccttgacga  3712

taatcgagcg aatggcgtcg gtggcctctg acagcggtat gtcgctgctc aggcgctgga  3772

aggtatcgcg gctgttatag ccggaaccat ccttgaggta gtgctcgtac atcgacagca  3832

gatcctggca cgccgtgatc agcgcagcca cattgccacg cagcagcgca tggccgatct  3892

ggtcgaagct gtgcagacaa tcggccagcc aatgcaggtc gtagcgtgca gtgctgggtt  3952

cgggcgcgtt gtggccgcgg ctgtaagcgc tgtaacggcg caggctgcgt gccacgcgcg  4012

cgacatgcgc aaacagcgtg ccgatttccg cagcgatatc caggcgctgc accatcacca  4072

tcggaatcac ctggtcgggc gtgtctgaag actgctgcgc cgaggcattc tgttcctgct  4132

gatcgagcga ttgcttcaac accgtgtagc tgcgttgcag ggactccagc tccagcgtgg  4192

tcgccgccgc acgtgctttc agctgcgaca gcgccgcctg atagcgcgca agactgtcct  4252

gggtgctggc gtgctgcccg tactcggcag tgagctggcg cccacgcacg aacgccaacc  4312

ccgtggcgat gagcgcccag agtgcgaagg caggcaccag gtagatcagg atgcccatgg  4372

aggctcctcg gaacgatgca tatcttgtcg gccaggaatc                        4412


<210>     44
<211>     486
<212>     PRT
<213>     Xanthomonas campestris

<400>     44

Met Arg Ala Ser Thr Asp Gln Glu Thr His Pro Met His Ala Thr Ser
1                 5                 10                15

Arg Pro Cys Pro Arg Thr Phe Trp Gln Arg Ala His Gln Leu Leu Leu
          20                25                30

Ile Ala Leu Thr Leu Leu Leu Thr Thr Ala Ser Ala Gln Ala Asp Val
```

109

```
                35                        40                         45
Ile Leu His Ala Phe Asn Trp Pro Tyr Ala Thr Val Glu Ala Arg Ala
    50                    55                    60

Lys Gln Ile Ala Asp Ala Gly Tyr Arg Lys Val Leu Val Ala Pro Ala
65                    70                    75                    80

Tyr Arg Ser Glu Gly Ser Ala Trp Trp Ala Arg Tyr Gln Pro Gln Asp
              85                    90                    95

Ile Arg Leu Ile Asp Asn Pro Leu Gly Asp Thr Thr Ala Phe Ala Arg
              100                   105                   110

Met Val Gln Ala Leu Ala Asn Asn Gly Val Glu Thr Tyr Ala Asp Val
              115                   120                   125

Val Phe Asn His Met Ala Asn Glu Ala Ala Thr Arg Ser Asp Leu Asn
              130                   135                   140

Tyr Pro Gly Ser Ala Val Leu Ala Gln Tyr Ala Ala Asn Pro Gly Arg
145                   150                   155                   160

Tyr Asp Ala Leu Arg Leu Phe Gly Thr Val Gln Ser Asn Phe Leu Ser
              165                   170                   175

Gly Ser Asp Phe Gly Pro Ala Gln Cys Ile Ser Asn Tyr Asn Asp Ala
              180                   185                   190

Phe Gln Val Arg Asn Tyr Arg Ile Cys Gly Gly Gly Ser Asp Pro Gly
              195                   200                   205

Leu Pro Asp Leu Leu Gly Asn Asp Trp Val Val Gln Gln Gln Arg Ala
    210                   215                   220

Tyr Leu Gln Ala Leu Lys Gly Leu Gly Val Thr Gly Phe Arg Val Asp
225                   230                   235                   240

Ala Ala Lys His Met Thr Phe Asp His Leu Asn Arg Val Phe Asp Ala
              245                   250                   255

Gly Ile Arg Ser Gly Val Tyr Val Phe Gly Glu Val Ile Thr Gly Gly
              260                   265                   270

Gly Ser Gly Asn Gly Asp Tyr Asp Gln Phe Leu Ala Pro Tyr Leu Gln
              275                   280                   285

Ser Thr Pro His Ala Ala Tyr Asp Phe Pro Leu Phe Asn Ala Val Arg
    290                   295                   300

Thr Ala Phe Gly Val Gly Ala Ser Met Gln Gln Leu Val Asp Pro Ala
305                   310                   315                   320

Ser Ala Gly Gln Ala Leu Pro Gly Asn Arg Ala Val Thr Phe Ala Val
              325                   330                   335

Thr His Asp Ile Pro Asn Asn Ala Gly Phe Arg Tyr Ala Ile Leu Asp
```

110

```
                340                    345                      350

Pro Val Asp Glu Thr Leu Ala Tyr Ala Tyr Leu Leu Gly Arg Asn Gly
    355                 360             365

Gly Val Pro Met Val Tyr Thr Asp Asn Asn Glu Ser Gly Asp Asn Arg
    370                 375             380

Trp Val Asn Ala Tyr Leu Arg Asp Asp Leu Arg Arg Met Ile Gly Phe
385                 390             395                     400

His Asn Gly Val Gln Gly Ser Asp Met Gln Val Leu Ser Ser Ser Ala
                405             410                 415

Cys His Ile Leu Phe Arg Arg Gly Ser Leu Gly Ile Val Gly Ile Asn
            420             425             430

Lys Cys Gly Asn Pro Val Asn Thr Thr Val Ala Met Asn Gly Ser Val
            435             440             445

Leu Phe Trp Asn Ala Asp Tyr Val Asp Ala Leu Gly Ser Gly Thr Val
    450                 455             460

Val Arg Ile Ser Ser Gly Ser Tyr Thr Phe Thr Leu Pro Ala Arg Gln
465                 470             475                     480

Ala Arg Met Trp Arg Arg
                485


<210>      45
<211>      570
<212>      PRT
<213>      Xanthomonas campestris

<400>      45

Val Arg Gly Ala Gly Pro Lys Arg Pro Gly Arg Ala Met Met Arg Ser
1               5               10                  15

Val Leu Met Ala Ala Met Leu Leu Tyr Ser Gly Ala Ala Cys Ala Ala
            20              25              30

Pro Ala Pro Gly Asp Tyr Tyr Gly Thr Leu Glu Pro Phe Ala Ala Asp
        35              40              45

Ala Val Tyr Phe Val Val Thr Asp Arg Phe Val Asn Gly Asp Thr Gly
    50              55              60

Asn Asp His Arg Asp Gln Gly Gly Ala His Arg Ser Phe Asp Val Pro
65              70              75                      80

Thr Pro Cys Asp Gly Gly Val Gly Asp Asn Ile Gly Tyr Leu Gly Gly
            85              90              95

Asp Phe Lys Gly Ile Val Asp His Ala Asp Tyr Ile Arg Gly Leu Gly
            100             105             110
```

```
Phe Gly Ala Val Trp Ile Thr Pro Ile Val Asp Asn Pro Asp Glu Ala
        115                 120                 125

Phe Thr Gly Gly Lys Pro Ile Thr Cys Glu Ser Thr Leu Ser Asp His
        130                 135                 140

Gly Lys Thr Gly Tyr His Gly Tyr Trp Gly Val Asn Phe Tyr Arg Leu
145                 150                 155                 160

Asp Glu His Leu Pro Ser Pro Gly Leu Asp Phe Ala Gly Phe Thr Arg
                165                 170                 175

Ala Met His Ala Asn Asp Leu Lys Val Val Leu Asp Ile Val Gly Asn
        180                 185                 190

His Gly Ser Pro Ala Tyr Ser Met Pro Val Ala Gln Pro Gly Phe Gly
        195                 200                 205

Lys Leu Tyr Asp Ala Gln Gly Arg Leu Val Ala Asp His Gln Asn Leu
        210                 215                 220

Ala Pro Ala Gln Leu Asp Pro Ala His Asn Pro Leu His Ala Phe Tyr
225                 230                 235                 240

Asn Thr Ser Gly Gly Leu Ala Glu Leu Ser Asp Leu Asn Glu Asp Asn
                245                 250                 255

Pro Ala Val Leu Asp Tyr Leu Ala Gly Ala Tyr Leu Gln Trp Met Glu
                260                 265                 270

Gln Gly Ala Asp Ala Phe Arg Ile Asp Thr Ile Gly Trp Met Pro Asp
        275                 280                 285

Arg Phe Trp His Ala Phe Val Ala Arg Ile Arg Glu Lys Arg Pro Gly
        290                 295                 300

Val Phe Met Phe Gly Glu Ala Phe Asp Tyr Asp Pro Ala Lys Ile Ala
305                 310                 315                 320

Gly His Thr Trp Ala Arg Asn Ala Gly Val Ser Val Leu Asp Phe Pro
                325                 330                 335

Leu Lys Gln Gln Leu Ser Ala Val Phe Gly His Lys Gln Ala Gly Phe
                340                 345                 350

Glu Gln Leu Ala Thr Pro Leu Tyr Leu Arg Lys Gly Pro Tyr Gly Asn
        355                 360                 365

Pro Tyr Glu Leu Met Ser Phe Tyr Asp Asn His Asp Met Ala Arg Leu
        370                 375                 380

Asp Ala Ser Asp Thr Gly Phe Ile Asp Ala His Asn Trp Leu Phe Thr
385                 390                 395                 400

Ala Arg Gly Ile Pro Val Ile Tyr Tyr Gly Ser Glu Thr Gly Phe Met
                405                 410                 415
```

112

```
Arg Gly Arg Ala Glu His Ala Gly Asn Arg Asn Tyr Phe Gly Glu Glu
            420                 425                 430

Arg Val Ser Asn Ala Pro Gln Ser Pro Ile Phe Gly Pro Leu Gln Arg
            435                 440                 445

Ile Ala Thr Leu Arg Arg Asn Thr Pro Ala Leu Gln Arg Gly Val Gln
    450                 455                 460

Val Asp Leu Gln Leu Arg Gly Asn Gln Ala Ala Phe Leu Arg Val Tyr
465                 470                 475                     480

Gln His Ala Gly Met Thr Gln Thr Ala Leu Val Leu Leu Asn Lys Gly
            485                 490                 495

Asp Ala Ala Ala Asp Ile Ala Val Ser Arg Leu Leu Gln Pro Gly Ser
            500                 505                 510

Trp Arg Asp Ala Phe Ser Gly Glu Gln Val Gln Val Gln Gly Arg Val
            515                 520                 525

Thr Leu Gln Val Pro Ala His Gly Val Arg Val Leu Leu Ser Asp Ala
    530                 535                 540

Pro Val Thr Asp Val Ala Leu Arg Lys Gln Leu Asp Ala Gln Met Ala
545                 550                 555                     560

Asp Gln Ala Ala Arg Asp Ala Arg Asn Lys
            565                 570


<210>      46
<211>      319
<212>      PRT
<213>      Xanthomonas campestris

<400>      46

Leu Leu Ala Gly Ala Thr Arg Val Leu Ala Gln Asp Arg His Leu Arg
1               5                   10                  15

Leu Leu Ala Ala Val Leu Ala Arg Leu His Ile Glu Arg Val Val Arg
            20                  25                  30

Leu Pro Pro Arg Ala Gly Arg Pro Pro Gly Pro Ala Gln Pro His Val
            35                  40                  45

Ala Val Leu Phe His Val Ala Gln His Ala Phe Gln Arg Val Val Ala
    50                  55                  60

Asp Arg Ile Val Gly Arg Ala Glu Leu Ala Gln Glu Ala Phe Leu Leu
65                  70                  75                      80

Val Leu Ala Gln Pro Val Gly Lys Ala Ala Gln Leu Val Cys Ala His
            85                  90                  95
```

113

Arg Gly Thr Gly Ala Phe Gly Leu Gly Ala Ala Val Val Ala Val Gln
            100   105   110

Val Leu Met Arg Phe Glu Gly Gln Ile Val Ala Gly Val Leu Glu Asn
            115   120   125

Leu Gln Gly Leu Gly Ile Gly Asp Ala Val Ala Gly Ala Ala Pro Ala
            130   135   140

Val Arg Ala Gly Val Gly Arg Ala Arg His Gln Asn Gln Ile Val Arg
145   150   155   160

Ala Gly Leu Ala Asp Gly Val Asp Arg Arg Leu Cys Gly Arg Gly Pro
                165   170   175

Val Gly Gly Gly Asp Ala Ile Gly Leu Val His Gln Pro Glu Asp His
                180   185   190

Leu Leu Val Val Phe Glu Leu Gln Arg Gln Ala Ala Pro Gln Ile Gly
            195   200   205

Gln Cys Cys Arg Arg His Leu Val Gly Ala Asp Ala Leu Ser Val Val
            210   215   220

Leu Gly Val Val Val Gln Val Gln Asp Gln Glu Leu Leu Val Gly Leu
225   230   235   240

Gly Gly Gly His Gly Phe Phe Asp Gln Arg Gln Leu Arg Arg Ile Gln
                245   250   255

Leu Ala Ile Glu Gly Trp Leu Gln Ala Leu Pro Gln Glu Arg Gln Ala
                260   265   270

Asn Gly Val His Ala Leu Ala Gly Glu Ile Ala Glu Ile Arg Arg Arg
            275   280   285

Arg Val Gly Val Val Leu Val Glu Arg Ala Gly Leu Leu Ala Arg Val
            290   295   300

Glu Leu Gly Ala Gly Asp Val Asp Ala His Val Leu Gln Ser Ala
305   310   315

<210>   47
<211>   555
<212>   PRT
<213>   Xanthomonas campestris

<400>   47

Val Arg Arg Arg Ser Gly Glu Leu Cys Arg Gln Leu Val Gly Leu Val
1   5   10   15

Phe Phe Leu Ser Thr Ala Leu Pro Ser Ile Ala Arg Gly Ala Gly Gly
            20   25   30

Met Ile Ala Met Ile Asp Pro Pro Thr Lys Arg Arg Thr Thr Thr Thr

114

```
                35                      40                      45

Gly Ala Trp Leu Ala Val Leu Ser Leu Leu Leu Leu Phe Ser Thr
     50                  55                  60

Pro Ser Val Arg Ala Ala Glu Pro Ala Thr Ser Gly Pro Tyr Gln Trp
65                  70                  75                  80

Arg Ser Val Ala Ile Gly Gly Gly Gly Phe Val Thr Gly Val Leu Phe
                 85                  90                  95

His Pro Ala Glu Arg Gly Leu Ala Tyr Ala Arg Thr Asp Val Gly Gly
            100                 105                 110

Ala Tyr Arg Trp Asp Ala Gln Ala Gln Gln Trp Thr Ala Leu Thr Asp
        115                 120                 125

Trp Leu Gly Ala Asp Asp Trp Asn Leu Met Gly Ile Asp Ala Phe Ala
        130                 135                 140

Val Asp Pro Ala Asp Ala Asp Ala Leu Tyr Leu Ala Ala Gly Thr Tyr
145                 150                 155                 160

Met His Glu Arg Ala Gly Thr Ala Ala Val Leu Arg Ser Phe Asn Arg
            165                 170                 175

Gly Arg Thr Phe Glu Arg Ala Asp Leu Pro Phe Lys Leu Gly Gly Asn
            180                 185                 190

Gln Leu Gly Arg Ala Asn Gly Glu Arg Leu Ala Val Asp Pro His Asp
        195                 200                 205

Gly Arg Val Leu Leu Leu Gly Ser Arg Asp Ala Gly Leu Trp Arg Ser
    210                 215                 220

Asp Asp Arg Gly Ala His Trp Ala Lys Val Ala Ser Phe Pro Asp Ala
225                 230                 235                 240

Ala Leu Ala Gly Ala Thr Ala Arg Asn His Val Gly Arg Glu Gln Ala
                245                 250                 255

Val Gly Ile Ala Phe Val Val Phe Asp Ala Ala Ser Gly Asn Asn Gly
            260                 265                 270

Ser Pro Thr Pro Arg Ile Tyr Val Gly Val Ser Thr Glu Gln Thr Ser
        275                 280                 285

Leu Tyr Val Ser Glu Asp Ala Gly Arg Ser Trp Ala Pro Val Ala Gly
    290                 295                 300

Gln Pro Arg Gly Leu Arg Pro Ser His Met Ala Gly Gly Ser Asp Gly
305                 310                 315                 320

His Trp Tyr Leu Ser Tyr Gly Asp Gln Pro Gly Pro Asp Leu Met Ala
            325                 330                 335

Gly Gly Ala Leu Trp Lys Phe Thr Pro Ala Gln Gly Arg Trp Arg Glu
```

115

Ile Ser Pro Ile Pro Gln Pro Ala Ser Gly Asp Gly Phe Gly Trp Gly
        355   360   365

Ala Val Ala Val Asp Pro Gln His Pro Gln Val Leu Leu Ala Ser Thr
        370   375   380

Phe Arg Arg Arg Thr Pro Arg Asp Glu Leu Tyr Arg Ser Val Asp Gly
385   390   395   400

Gly Lys His Trp Thr Pro Leu Leu Ala Asp Ala Val Phe Asp His Ser
                405   410   415

Ala Ala Pro Trp Thr Ala His Ala Thr Pro His Trp Met Gly Ala Leu
                420   425   430

Ala Ile Asp Pro Phe Asp Gly Asn His Ala Leu Phe Val Thr Gly Tyr
                435   440   445

Gly Ile Trp Ala Ser Arg Asn Leu Gln Asp Phe Ala Ala Pro Gln Arg
        450   455   460

Pro Leu Gln Trp Trp Phe Gln Asp Arg Gly Leu Glu Glu Thr Val Pro
465   470   475   480

Leu Asp Leu Leu Ser Pro Met Ala Gly Ala His Leu Leu Ser Ala Leu
                485   490   495

Gly Asp Ile Asp Gly Phe Arg His Asp Asp Leu Asp Arg Val Gln Leu
                500   505   510

Gln Tyr Ala Gly Pro Arg Leu Thr Asn Gly Glu Ser Ile Asp Ala Ala
        515   520   525

Gly Gln Ala Pro Gln Trp Val Val Arg Ser Gly Thr Val Arg Ala Arg
        530   535   540

Arg Asn Asn Glu Ile Arg Ala Leu Tyr Tyr Ala
545   550   555

<210>   48
<211>   582
<212>   PRT
<213>   Xanthomonas campestris

<400>   48

Ile Ala Leu Ala Thr Leu Ile Pro Val Thr Ala Pro Ala Met Gln Val
1   5   10   15

Ser Thr Gln Ala Pro Leu Val Asp Ala Thr Gly Gln Thr Leu His Ile
                20   25   30

Arg Gly Val Thr Trp Pro Gly Phe Asp Arg Ala Gly Leu Ala Ala Val
        35   40   45

```
Gly Met Arg Asn Asn Thr Leu Ala Gln Leu Leu Asp Arg Met Gln Ala
    50                  55                  60

Ser Asp Ile Asn Ala Val Arg Val Pro Val Cys Ala Ala Val Leu Gln
65                  70                  75                  80

Arg Ala Pro Val Ala Ala Ala Glu Val Ala Gly Asp Ser Thr Leu Arg
                85                  90                  95

Gly Leu Asp Ser Leu Gln Leu Leu Asp Ala Val Val His Ala Ala Ser
            100                 105                 110

Gln Arg Gly Met Gln Val Met Phe Ala Phe Ala Asp Gly Gly Cys Asp
        115                 120                 125

Asp Arg Ala Pro Leu Leu Gly Ala Gln Gln Gln Ala Trp Thr Arg Gly
        130                 135                 140

Leu Val Thr Leu Ala Arg Arg Tyr Gly Gly Asn Ala Asn Val Leu Gly
145                 150                 155                 160

Ile Asp Leu Gly Ser Ser Gly Tyr Arg Asn Ala Ser Trp Ala Gly Asn
            165                 170                 175

Ala Ala Asp Gln Asp Trp Asn Arg Val Ala Ser Arg Ala Val Ala Arg
        180                 185                 190

Val Leu Ala Gln Ala Pro Arg Trp Val Val Gly Val Glu Gly Val Gly
        195                 200                 205

Ser Asn Ala Val Cys Ser Asp Pro Glu Arg Lys Ala Pro Gly Ser Asn
210                 215                 220

Leu Gln Pro Phe Ala Cys Val Pro Leu Asp Ile Ala Arg Arg His Leu
225                 230                 235                 240

Val Leu Met Pro Lys Leu Ala Gly Pro Asp Arg Asp Thr Thr Asp Ala
            245                 250                 255

Phe Ala Ala Pro Gly Phe Ala Gln Ala Leu Pro Ala Met Trp Gln Arg
            260                 265                 270

Asp Phe Gly Gln Phe Ala Ile Asp His Ala Val Val Pro Val Ser Leu
        275                 280                 285

Gly Gly Gly Leu Gly Asp Gly Asp Pro Arg Asp Pro Ala Trp Gln Thr
        290                 295                 300

Ala Leu Ser Gly Tyr Leu Ala Asn Ala Gly Ile Arg Ser Ala Phe Leu
305                 310                 315                 320

Gly Ser Trp Glu Thr Gly Asn Ala Asn Asn Gly Gly Leu Leu Ala Pro
            325                 330                 335

Asp Gly Ser Pro Arg Ala Asp Lys Leu Leu Ile Leu Arg His Ala Trp
        340                 345                 350
```

117

Gly Arg Leu Pro Val Met Pro Ala Ile Ala Thr Ala Thr Gly Asp Ser
    355   360   365

Thr Lys Asn Ala Ser Gly Lys Lys Pro Trp Asn Ser Thr Phe Thr Gly
    370   375   380

Thr Ala Thr Val Thr Gly Ser Gly Tyr Ser Gly Gly Ala Leu Leu Leu
385   390   395   400

Asp Pro Ile Pro Ser Asp Ala Phe Ile Thr Ala Leu Asn Pro Val Gln
            405   410   415

Leu Asn Phe Gly Gly Val Lys Ala Ala Leu Ala Gly Ala Tyr Leu Gln
        420   425   430

Val Asn Gly Pro Lys Gly Thr Thr Thr Val Tyr Val Thr Asp Leu Tyr
        435   440   445

Pro Glu Gly Ala Ser Gly Gly Leu Asp Leu Ser His Asn Ala Phe Ala
    450   455   460

Ala Ile Gly Asp Met Val Gln Gly Arg Ile Pro Ile Ser Trp Lys Val
465   470   475   480

Val Arg Ala Pro Val Thr Gly Asn Leu Gln Tyr Arg Ile Lys Glu Gly
        485   490   495

Ser Ser Arg Trp Trp Ala Ala Ile Gln Val Arg Asn His Ala Tyr Pro
        500   505   510

Val Val Lys Leu Glu Val Lys Gln Gly Ser Thr Trp Lys Asn Leu Gln
        515   520   525

Lys Met Asp Tyr Asn His Phe Leu Gly Glu Gln Leu Gly Asn Gln Pro
    530   535   540

Leu Thr Leu Arg Ile Thr Asp Ile Arg Gly Lys Val Leu Thr Asp Thr
545   550   555   560

Leu Pro Arg Leu Pro Glu Asp Gly Ser Lys Pro Ala Tyr Phe Glu Pro
        565   570   575

Gly His Val Gln Phe Pro
        580

<210>	49
<211>	555
<212>	PRT
<213>	Xanthomonas campestris

<400>	49

Thr Ser Lys Leu Ala Val Ser Leu Leu Thr Gly Ala Leu Leu Val Pro
1   5   10   15

Val Ala Ala Ser Ala Gln Ser His Val Asp Asn Pro Phe Val Gly Ala
         20   25   30

Ser Gly Tyr Leu Asn Pro Asp Tyr Ser Lys Glu Val Asn Ser Ser Ile
        35   40   45

Val Lys Val Lys Asp Val Gln Leu Lys Ala Lys Met Gln Val Val Lys
    50   55   60

Ser Tyr Pro Thr Ser Val Trp Leu Asp Ser Ile Asn Ala Ile Tyr Gly
65   70   75   80

Gly Ser Arg Asn Ala Gly Arg Leu Ser Leu Gln Gly His Leu Asp Ala
         85   90   95

Ala Leu Ala Gln Lys Lys Ala Asn Thr Pro Ile Thr Val Gly Phe Val
        100   105   110

Ile Tyr Asp Met Pro Gly Arg Asp Cys His Ala Leu Ala Ser Asn Gly
      115   120   125

Glu Leu Pro Leu Thr Gln Ala Gly Leu Gln Arg Tyr Lys Thr Glu Tyr
      130   135   140

Ile Asp Val Ile Ala Ser Thr Leu Ala Asn Pro Lys Tyr Lys Asp Leu
145   150   155   160

Arg Ile Val Asn Ile Ile Glu Pro Asp Ser Leu Pro Asn Leu Val Thr
         165   170   175

Asn Gln Ser Thr Pro Ala Cys Gly Gln Ala Ala Ser Ser Gly Ile Tyr
        180   185   190

Glu Ala Ala Ile Lys Tyr Ala Leu Asp Lys Leu His Ala Thr Pro Asn
      195   200   205

Leu Tyr Asn Tyr Leu Asp Ile Gly His Ser Gly Trp Leu Gly Trp Asp
      210   215   220

Ser Asn Arg Ser Pro Ala Ile Ser Leu Tyr Thr Arg Val Val Gln Gly
225   230   235   240

Thr Ala Ala Gly Leu Ala Ser Ala Asp Gly Phe Ile Thr Asn Thr Ala
        245   250   255

Asn Tyr Thr Pro Leu His Glu Pro Asn Leu Pro Asn Pro Asp Leu Thr
        260   265   270

Ile Gly Gly Gln Pro Ile Arg Ser Ser Asn Phe Tyr Gln Trp Asn Ser
        275   280   285

Phe Phe Asp Glu Ser Thr Tyr Ala Glu Ala Leu Tyr Asn Gly Phe Val
      290   295   300

Gly Ala Gly Trp Ser Ser Lys Ile Gly Phe Leu Ile Asp Thr Gly Arg
305   310   315   320

Asn Gly Trp Gly Gly Lys Ala Arg Pro Ala Ser Ala Ser Gly Asn Asp
            325   330   335

Ile Asn Thr Tyr Val Asp Ser Gly Arg Val Asp Arg Arg Leu His Arg
            340   345   350

Gly Asn Trp Cys Asn Gln Ser Gly Ala Gly Ile Gly Met Pro Pro Thr
            355   360   365

Ala Ala Pro Gly Gly His Ile His Ala Leu Val Trp Gly Lys Gly Pro
    370   375   380

Gly Glu Ser Asp Gly Ala Ser Lys Ser Ile Ala Asn Asn Gln Gly Lys
385   390   395   400

Gly Phe Asp Arg Tyr Cys Asp Pro Thr Tyr Thr Thr Pro Asp Gly Thr
            405   410   415

Leu Thr Gly Ala Leu Pro Asn Ala Pro Ile Ala Gly Asn Trp Phe His
            420   425   430

Ala Gln Phe Leu Gln Leu Val Ala Asn Ala Tyr Pro Ala Ile Gly Thr
            435   440   445

Ser Thr Lys Ala Ala Leu Gln Ser Ala Ser Thr Asp Ala Val Pro Ala
    450   455   460

Ser Arg Pro Thr Ala Thr Lys Gly Leu Thr Ala Asn Ala Ala Asp Gly
465   470   475   480

Glu Val Arg Leu Ser Trp Ser Pro Val Ala Gly Ala Thr Gly Tyr Thr
            485   490   495

Val Gln Arg Val Ala Asp Ala Thr Ala Ala Pro Ile Thr Val Ala Ser
            500   505   510

Gly Leu Thr Ser Pro Ser Tyr Val Asp Gln Thr Leu Thr Asn Gly Thr
            515   520   525

Thr Tyr Tyr Tyr Lys Val Thr Ala Asn Gly Ala Ser Gly Ala Asp Ala
    530   535   540

Ser Ser Val Thr Val Ser Ala Thr Pro His Arg
545   550   555

<210>   50
<211>   535
<212>   PRT
<213>   Xanthomonas campestris

<400>   50

Val Arg Glu Ser Asp Arg Ser Arg Ser Arg Asp Val Ile Gly Ala Ala
1   5   10   15

Met Val Phe Ser Val Gly Thr Ile Thr Pro Arg Asp Ala Arg Thr Asp

120

```
                    20                       25                          30

Gln Asp Ala Arg Leu Thr Ala Leu Gly Cys Arg Ala Arg Phe Ser Arg
        35                  40                  45

Glu Ile Thr Met Ser Ile Phe Arg Thr Ala Ser Thr Leu Ala Leu Ala
        50                  55                  60

Thr Ala Leu Ala Leu Ala Ala Gly Pro Ala Phe Ser Tyr Ser Ile Asn
65                  70                  75                  80

Asn Ser Arg Gln Ile Val Asp Asp Ser Gly Lys Val Val Gln Leu Lys
                85                  90                  95

Gly Val Asn Val Phe Gly Phe Glu Thr Gly Asn His Val Met His Gly
            100                 105                 110

Leu Trp Ala Arg Asn Trp Lys Asp Met Ile Val Gln Met Gln Gly Leu
            115                 120                 125

Gly Phe Asn Ala Val Arg Leu Pro Phe Cys Pro Ala Thr Leu Arg Ser
        130                 135                 140

Asp Thr Met Pro Ala Ser Ile Asp Tyr Ser Arg Asn Ala Asp Leu Gln
145                 150                 155                 160

Gly Leu Thr Ser Leu Gln Ile Leu Asp Lys Val Ile Ala Glu Phe Asn
                165                 170                 175

Ala Arg Gly Met Tyr Val Leu Leu Asp His His Thr Pro Asp Cys Ala
                180                 185                 190

Gly Ile Ser Glu Leu Trp Tyr Thr Gly Ser Tyr Thr Glu Ala Gln Trp
        195                 200                 205

Leu Ala Asp Leu Arg Phe Val Ala Asn Arg Tyr Lys Asn Val Pro Tyr
        210                 215                 220

Val Leu Gly Leu Asp Leu Lys Asn Glu Pro His Gly Ala Ala Thr Trp
225                 230                 235                 240

Gly Thr Gly Asn Ala Ala Thr Asp Trp Asn Lys Ala Ala Glu Arg Gly
                245                 250                 255

Ser Ala Ala Val Leu Ala Val Ala Pro Lys Trp Leu Ile Ala Val Glu
                260                 265                 270

Gly Ile Thr Asp Asn Pro Val Cys Ser Thr Asn Gly Gly Ile Phe Trp
        275                 280                 285

Gly Gly Asn Leu Gln Pro Leu Ala Cys Thr Pro Leu Asn Ile Pro Ala
        290                 295                 300

Asn Arg Leu Leu Leu Ala Pro His Val Tyr Gly Pro Asp Val Phe Val
305                 310                 315                 320

Gln Ser Tyr Phe Asn Asp Ser Asn Phe Pro Asn Asn Met Pro Ala Ile
```

121

Trp Glu Arg His Phe Gly Gln Phe Ala Gly Thr His Ala Leu Leu Leu
            340   345   350

Gly Glu Phe Asp Gly Lys Tyr Gly Glu Gly Asp Ala Arg Asp Lys Thr
            355   360   365

Trp Gln Asp Ala Leu Val Lys Tyr Leu Arg Ser Lys Gly Ile Asn Gln
    370   375   380

Gly Phe Tyr Trp Ser Trp Asn Pro Asn Ser Gly Asp Thr Gly Gly Ile
385   390   395   400

Leu Arg Asp Asp Trp Thr Ser Val Arg Gln Asp Lys Met Thr Leu Leu
            405   410   415

Arg Thr Leu Trp Gly Thr Ala Gly Asn Thr Thr Pro Thr Pro Thr Pro
            420   425   430

Thr Pro Thr Pro Thr Pro Thr Pro Thr Pro Thr Pro Thr Pro Thr Pro
            435   440   445

Thr Pro Gly Thr Ser Thr Phe Ser Thr Lys Val Ile Val Asp Asn Ser
    450   455   460

Trp Asn Gly Gly Tyr Cys Asn Arg Val Gln Val Thr Asn Thr Gly Thr
465   470   475   480

Ala Ser Gly Thr Trp Ser Ile Ala Val Pro Val Thr Gly Thr Val Asn
            485   490   495

Asn Ala Trp Asn Ala Thr Trp Ser Gln Ser Gly Ser Thr Leu Arg Ala
            500   505   510

Ser Gly Val Asp Phe Asn Arg Thr Leu Ala Ala Gly Ala Thr Ala Glu
            515   520   525

Phe Gly Phe Cys Ala Ala Ser
    530   535

<210>   51
<211>   333
<212>   PRT
<213>   Xanthomonas campestris

<400>   51

Met Leu Cys Ile Ala Thr Met Ser Ile Ala Gln Ala Gln Ser Pro Asn
1   5   10   15

Arg Leu Lys Tyr Ala Gly Val Asn Ile Ser Gly Ala Glu Ile Gln Ser
            20   25   30

Ser Lys Lys Pro Gly Val Leu Asn Ile Asp Tyr Arg Tyr Pro Thr Ala
            35   40   45

```
Ser Glu Tyr Arg Tyr Phe Ala Gly Lys Gln Met Asn Ile Val Arg Leu
    50                  55                  60

Pro Ile Leu Trp Glu Arg Met Gln Pro Lys Ala Gln Gly Pro Leu Asp
65                  70                  75                  80

Gln Ala Gln Leu Ala Leu Leu Lys Gln Ala Val Ala Asn Ala Lys Ala
                85                  90                  95

Ala Asn Gln Tyr Leu Ile Ile Asp Val His Asn Tyr Ala Lys Tyr Tyr
                100                 105                 110

Gly Gln Lys Ile Gly Ser Lys Arg Val Pro Val Arg Thr Phe Thr Asp
            115                 120                 125

Leu Trp Arg Arg Leu Ala Ile Ala Phe Lys Ser Asp Asn Ala Val Ile
    130                 135                 140

Phe Gly Leu Met Asn Glu Pro Tyr Asp Ile Ser Pro Glu Ser Trp Ala
145                 150                 155                 160

Ala Ala Ala Gln Ala Ser Ile Asp Ser Ile Arg Ala Thr Gly Ala Thr
                165                 170                 175

Asn Leu Ile Leu Val Pro Gly Ala Leu Trp Ser Gly Ala His Ser Trp
            180                 185                 190

Tyr Ser Thr Val Ala Gly Gln Ser Asn Ala Val Ala Leu Ala Asn Ile
            195                 200                 205

Arg Asp Pro Leu Asn Arg Tyr Ala Ile Glu Val His Gln Tyr Leu Asp
    210                 215                 220

Thr Asp Ser Ser Gly Thr Ser Ala Gly Cys Val Ser Arg Thr Ile Gly
225                 230                 235                 240

Ala Glu Arg Leu Arg Ser Phe Thr Gly Trp Leu Arg Ala Gln Gly Lys
                245                 250                 255

Arg Gly Phe Leu Gly Glu Phe Gly Thr Ala Asn Asn Ala Thr Cys Thr
            260                 265                 270

Ala Ala Leu Asp Gly Met Leu Gly Tyr Leu Glu Thr Asn His Asp Val
            275                 280                 285

Trp Ile Gly Trp Thr Phe Trp Ala Ala Gly Ala Trp Trp Asn Thr Ser
    290                 295                 300

Tyr Pro Phe Asn Val Gln Pro Asp Ala Gln Gly Arg Asp Lys Pro Gln
305                 310                 315                 320

Met Lys Thr Leu Ser Ala Arg Ala His Arg Val Thr Arg
                325                 330
```

<210>   52
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<211>   335
<212>   PRT
<213>   Xanthomonas campestris

<400>   52

```
Val Phe Phe Leu Leu Leu Gly Val Leu Pro Met Gly His Ala Gln Thr
1               5                   10                  15

Arg Ala Leu Lys Tyr Ala Gly Val Asn Leu Ala Gly Ala Glu Phe Ala
                20                  25                  30

Ser Ser Lys Lys Pro Gly Val Leu Asn Lys Asp Tyr Met Tyr Pro Ala
                35                  40                  45

Ser Thr Asp Tyr Ser Tyr Phe Ala Gly Thr Gly Met Asn Val Ile Arg
        50                  55                  60

Leu Pro Ile Leu Trp Glu Arg Leu Gln Pro Ala Ala Arg Gly Glu Leu
65                  70                  75                  80

Asp Pro Ala Gln Leu Ala Leu Val Gln Gln Ala Val Ala Arg Ala Lys
                85                  90                  95

Ala Ser Gly Met Tyr Leu Val Leu Asp Ile His Asn Tyr Ser Lys Tyr
                100                 105                 110

Tyr Gly Tyr Lys Met Gly Gly Pro Glu Val Pro Leu Ala Thr Phe Ala
        115                 120                 125

Asp Leu Trp Arg Arg Leu Ala Val Ile Phe Asn Ser Asp Asn Ala Val
        130                 135                 140

Ile Phe Gly Leu Met Asn Glu Pro Asn Asn Ile Ser Ala Ser Glu Trp
145                 150                 155                 160

Ala Gly Ala Ala Gln Ala Gly Ile Asp Ala Ile Arg Ala Thr Gly Ala
                165                 170                 175

Asn Asn Leu Ile Leu Val Pro Gly Ala Leu Trp Thr Gly Ala His Ser
                180                 185                 190

Trp His Ser Leu Thr Ser Asp Gly Tyr Ser Asn Ala Thr Ala Leu Ala
        195                 200                 205

Ser Ile Ser Asp Pro Leu Asn Arg Tyr Ala Phe Glu Val His Gln Tyr
        210                 215                 220

Leu Asp Ala Asp Ser Ser Gly Thr Ser Ser Val Cys Val Ser Glu Thr
225                 230                 235                 240

Ile Gly Ala Asp Arg Leu Arg Ala Phe Thr Glu Trp Leu Arg Thr Asn
                245                 250                 255

Asn Lys Arg Gly Phe Leu Gly Glu Phe Gly Thr Ala Asn Asn Ala Val
                260                 265                 270
```

124

Cys Asn Thr Ala Leu Gln Gly Met Leu Ala Tyr Met Glu Asn Tyr Ala
        275   280   285

Asp Val Trp Leu Gly Trp Thr Trp Trp Ala Ala Gly Ala Trp Trp Asn
    290   295   300

Thr Ser Tyr Ala Tyr Asn Val His Pro Asn Lys Asp Gly Thr Asp Lys
305   310   315   320

Pro Gln Met Val Ile Leu Ser Pro Gln Ala Ala Arg Ala Thr Arg
            325   330   335

<210>   53
<211>   343
<212>   PRT
<213>   Xanthomonas campestris

<400>   53

Ile Leu Pro Pro Tyr Leu Leu Asp His Val Ala Gln Ala Ala Pro Glu
1   5   10   15

Arg Ala Arg His Cys Ala Gln Leu Thr Arg His Ile Thr Ala Gln Leu
            20   25   30

Arg Gln Arg Arg Ala Gln Gly Leu Leu Ala Arg Asp Ser Ala Asp Asp
        35   40   45

Ala Pro Thr Ala Thr Thr Asp Thr Ala Val Gln Arg His Leu Tyr Asp
    50   55   60

Ala Gln Gln Gly Thr Ala Leu Pro Gly Val Leu Val Arg Glu Glu Gly
65   70   75   80

Ala Pro Pro Thr Asp Asp Val Ala Val Thr Glu Ala Tyr Asp Tyr Leu
            85   90   95

Gly Ala Thr His Ala Phe Phe Gln Gln Val Tyr Ala Arg Asn Ser Ile
            100   105   110

Asp Asp Ala Gly Met Pro Leu Leu Gly Thr Val His Tyr Glu Arg Asn
        115   120   125

Tyr Asp Asn Ala Phe Trp Thr Gly Glu Gln Met Val Phe Gly Asp Gly
    130   135   140

Asp Gly Glu Ile Phe Thr Arg Phe Thr Ile Ala Ile Asp Val Val Ala
145   150   155   160

His Glu Leu Thr His Gly Val Ile Glu Arg Thr Ala Asn Leu Ile Tyr
            165   170   175

Gln Gly Gln Ser Gly Ala Leu Asn Glu Ser Val Ser Asp Val Phe Gly
        180   185   190

Val Leu Val Lys Gln Tyr Ala Leu Arg Gln Asp Ala Ala Gln Ala Asp

125

Trp Leu Val Gly Ala Gly Met Phe Leu Pro Gly Val Gln Gly Val Ala
    210   215   220

Leu Arg Ser Met Gln Ala Pro Gly Thr Ala Tyr Asp Asp Pro Ala Leu
225   230   235   240

Gly Lys Asp Pro Gln Pro Ala His Met Asp Ala Tyr Val Asp Thr Gln
                245   250   255

Glu Asp Asp Gly Gly Val His Tyr Asn Ser Gly Ile Pro Asn Arg Ala
                260   265   270

Phe Gln Arg Ala Ala Val Ala Ile Gly Gly Tyr Ala Trp Glu Lys Ala
            275   280   285

Gly Arg Ile Trp Tyr Arg Ala Leu Thr Gly Gly Ala Leu Ser Ala Ser
    290   295   300

Ala Asp Phe Ala Thr Phe Ala Ala Leu Thr Val Arg Val Ala Ser Thr
305   310   315   320

Asp Tyr Gly Ala Gly Ser Ala Glu Ala Ser Ala Val Glu Gln Ala Trp
                325   330   335

Arg Asp Val Gly Val Leu Ala
                340

<210>   54
<211>   289
<212>   PRT
<213>   Xanthomonas campestris

<400>   54

Arg Val Val Leu Phe Leu Leu Thr Asn Phe Ala Val Leu Ile Leu Ala
1   5   10   15

Gly Ile Val Met Ser Val Leu Gly Val Asn Pro Ala Gln Met Ser Gly
            20   25   30

Leu Leu Val Met Ala Ala Ile Phe Gly Phe Gly Gly Ser Phe Ile Ser
            35   40   45

Leu Leu Leu Ser Lys Phe Met Ala Lys Arg Ser Thr Gly Ala Gln Val
        50   55   60

Ile Thr Glu Pro Arg Thr Gln Thr Glu Arg Trp Leu Val Asp Thr Val
65   70   75   80

Arg Arg Gln Ala Gln Ala Ala Gly Ile Gly Met Pro Glu Val Ala Ile
                85   90   95

Tyr Asp Gly Pro Glu Ile Asn Ala Phe Ala Thr Gly Ala Asn Arg Asn
            100   105   110

Asn Ala Leu Val Ala Val Ser Thr Gly Leu Leu Gln His Met Arg Glu
    115   120   125

Asp Glu Ala Glu Ala Val Leu Gly His Glu Ile Ala His Ile Ala Asn
    130   135   140

Gly Asp Met Val Thr Met Ala Leu Leu Gln Gly Val Leu Asn Thr Phe
145   150   155   160

Val Ile Val Leu Ala Arg Val Val Gly Gly Ile Ile Asp Ser Ala Leu
           165   170   175

Ser Gly Asn Arg Asp Ser Gly Arg Gly Phe Ala Tyr Tyr Ile Ile Val
        180   185   190

Phe Val Leu Glu Met Val Phe Gly Leu Phe Ala Thr Met Ile Ala Met
      195   200   205

Trp Phe Ser Arg Arg Arg Glu Phe Arg Ala Asp Ala Gly Gly Ala Gln
    210   215   220

Leu Ala Gly Arg Asn Lys Met Ile Ala Ala Leu Glu Arg Leu Ser Leu
225   230   235   240

Asn His Gly Gln Asn Thr Leu Pro Ser Gln Val Gln Ala Phe Gly Ile
        245   250   255

Ser Gly Gly Val Gly Glu Gly Leu Arg Arg Leu Phe Leu Ser His Pro
        260   265   270

Pro Leu Thr Glu Arg Ile Ala Ala Leu Arg Ala Ser Asn Gly Thr Ala
    275   280   285

Met

<210> 55
<211> 580
<212> PRT
<213> Xanthomonas campestris

<400> 55

Met Ser Thr Ala Ser Leu Arg Lys Arg Thr Gly Ser Leu Thr Ile Leu
1   5   10   15

Gly Ala Ser Ala Leu Thr Ser Leu Leu Leu Ala Met Pro Ala Phe Ala
        20   25   30

Gly Glu Val Tyr Leu Asp Gly Leu Ala Thr Ala Gln Thr His Gln Lys
        35   40   45

Phe Ile Val Thr Tyr Lys Asp Gly Ser Thr Ala Leu Ala Ser Pro Ser
    50   55   60

Ala Leu Thr Thr Ser Leu Arg Thr Ala Ala Arg Ala Val Pro Ala Lys

127

Ala Gly Lys Ala Leu Gly Leu Asn Ser Val Arg Arg Leu Ala Leu Gly
                85   90   95

Pro Glu Leu Val Arg Ala Asp Arg Ala Leu Asp Arg Ala Glu Ala Glu
                100   105   110

Thr Leu Met Arg Gln Leu Ala Ala Asp Pro Asn Val Gln Ser Val Glu
                115   120   125

Val Asp Gln Ile Leu His Ala Thr Leu Thr Pro Asn Asp Thr Arg Leu
        130   135   140

Ser Glu Gln Trp Ala Phe Gly Thr Thr Asn Ala Gly Leu Asn Ile Arg
145   150   155   160

Pro Ala Trp Asp Lys Ala Thr Gly Ser Gly Thr Val Val Ala Val Ile
                165   170   175

Asp Thr Gly Ile Thr Ser His Ala Asp Leu Asn Ala Asn Ile Leu Ala
                180   185   190

Gly Tyr Asp Phe Ile Ser Asp Ala Thr Thr Ala Arg Asp Gly Asn Gly
        195   200   205

Arg Asp Ser Asn Ala Ala Asp Glu Gly Asp Trp Tyr Ala Ala Asn Glu
        210   215   220

Cys Gly Ala Gly Ile Pro Ala Ala Ser Ser Ser Trp His Gly Thr His
225   230   235   240

Val Ala Gly Thr Val Ala Ala Val Thr Asn Asn Thr Thr Gly Val Ala
                245   250   255

Gly Thr Ala Tyr Gly Ala Lys Val Val Pro Val Arg Val Leu Gly Lys
        260   265   270

Cys Gly Gly Ser Leu Ser Asp Ile Ala Asp Ala Ile Val Trp Ala Ser
        275   280   285

Gly Gly Thr Val Ser Gly Ile Pro Ala Asn Ala Asn Pro Ala Glu Val
        290   295   300

Ile Asn Met Ser Leu Gly Gly Gly Gly Ser Cys Ser Thr Thr Met Gln
305   310   315   320

Asn Ala Ile Asn Gly Ala Val Ser Arg Gly Thr Thr Val Val Val Ala
                325   330   335

Ala Gly Asn Asp Ala Ser Asn Val Ser Gly Ser Leu Pro Ala Asn Cys
        340   345   350

Ala Asn Val Ile Ala Val Ala Ala Thr Thr Ser Ala Gly Ala Lys Ala
        355   360   365

Ser Tyr Ser Asn Phe Gly Thr Gly Ile Asp Val Ser Ala Pro Gly Ser

128

Ser Ile Leu Ser Thr Leu Asn Ser Gly Thr Thr Thr Pro Gly Ser Ala
385   390   395   400

Ser Tyr Ala Ser Tyr Asn Gly Thr Ser Met Ala Ser Pro His Val Ala
                  405   410   415

Gly Val Val Ala Leu Val Gln Ser Val Ala Pro Thr Ala Leu Thr Pro
                  420   425   430

Ala Ala Val Glu Thr Leu Leu Lys Asn Thr Ala Arg Ala Leu Pro Gly
              435   440   445

Ala Cys Ser Gly Gly Cys Gly Ala Gly Ile Val Asn Ala Asp Ala Ala
      450   455   460

Val Thr Ala Ala Ile Asn Gly Gly Ser Gly Gly Gly Gly Gly Gly Gly
465   470   475   480

Asn Thr Leu Thr Asn Gly Thr Pro Val Thr Gly Leu Gly Ala Ala Thr
                  485   490   495

Gly Ala Glu Leu Asn Tyr Thr Ile Thr Val Pro Ala Gly Ser Gly Thr
              500   505   510

Leu Thr Val Thr Thr Ser Gly Gly Ser Gly Asp Ala Asp Leu Tyr Val
              515   520   525

Arg Ala Gly Ser Ala Pro Thr Asp Ser Ala Tyr Thr Cys Arg Pro Tyr
      530   535   540

Arg Ser Gly Asn Ala Glu Thr Cys Thr Ile Thr Ala Pro Ser Gly Thr
545   550   555   560

Tyr Tyr Val Arg Leu Lys Ala Tyr Ser Thr Phe Ser Gly Val Thr Leu
                  565   570   575

Arg Ala Ser Tyr
            580

<210>   56
<211>   483
<212>   PRT
<213>   Xanthomonas campestris

<400>   56

Met Arg Arg Leu Ser Ala Gly Pro Met Leu Leu Val Ala Asp Arg Arg
1   5   10   15

Leu Asp Arg Val Asp Ser Glu Ser Leu Met Arg Arg Leu Ala Ala Asp
              20   25   30

Pro Thr Val Lys Arg Val Glu Val Asp Val Leu Met Arg Pro Leu Leu
              35   40   45

129

```
Ala Pro Asn Asp Pro Gly Leu Pro Gln Gln Trp Ala Met Gly Thr Thr
    50              55              60

Thr Ala Ser Leu Asn Val Arg Pro Ala Trp Asp Arg Thr Thr Gly Lys
65              70              75              80

Gly Ile Val Val Ala Val Ile Asp Thr Gly Ile Thr Ala His Pro Asp
            85              90              95

Leu Ala Ala Asn Val Leu Pro Gly Tyr Asp Phe Ile Thr Asp Pro Thr
            100             105             110

Val Ala Gly Asp Gly Asn Gly Arg Asp Asn Asn Ala Ala Asp Gln Gly
        115             120             125

Asp Trp Ser Ala Ala Asn Ala Cys Gly Ala Gly Ala Ser Ala Ser Asn
    130             135             140

Ser Ser Trp His Gly Thr His Val Ala Gly Ile Val Ala Ala Val Gly
145             150             155             160

Asn Asn Ala Ala Gly Val Val Gly Thr Ala Phe Asn Ala Lys Leu Leu
            165             170             175

Pro Leu Arg Val Leu Gly Lys Cys Gly Gly Tyr Met Ser Asp Ile Ala
        180             185             190

Asp Ala Ile Val Trp Ala Ser Gly Gly Lys Val Thr Gly Val Pro Ala
        195             200             205

Asn Pro Asn Pro Ala Thr Val Ile Asn Leu Ser Leu Gly Gly Tyr Gly
    210             215             220

Ser Cys Ser Thr Ile Ile Gly Asn Ala Ile Thr Gly Ala Val Thr Arg
225             230             235             240

Gly Thr Ala Val Val Val Ala Ala Gly Asn Ser Asn Met Asp Val Ala
            245             250             255

Thr Ser Met Pro Ala Asn Cys Ala Asn Val Ile Ala Val Ala Ala Thr
            260             265             270

Thr Ser Ala Gly Ala Lys Ala Ser Phe Ser Asn Phe Gly Lys Gly Val
        275             280             285

Asp Ile Ala Ala Pro Gly Gln Ala Ile Ile Ser Thr Leu Asn Ser Gly
    290             295             300

Thr Thr Val Pro Ala Asn Pro Ala Tyr Ala Val Tyr Ser Gly Thr Ser
305             310             315             320

Met Ala Ala Pro His Val Ala Gly Val Val Ala Leu Met Gln Ser Val
            325             330             335

Ala Leu Asn Pro Leu Thr Pro Ala Thr Val Glu Ala Leu Leu Lys Ser
            340             345             350
```

Ser Ala Arg Pro Leu Pro Val Ala Cys Ala Pro Gly Cys Gly Ala Gly
        355   360   365

Leu Val Asn Ala Asp Gly Ala Val Ala Ala Val Ile Asn Ala Thr Leu
        370   375   380

Leu Thr Ser Asn Ala Val Arg Thr Gly Leu Ser Ala Ala Ile Gly Asp
385   390   395   400

Ser Leu Tyr Tyr Gln Val Lys Val Pro Ala Gly Thr Arg Ser Leu Lys
            405   410   415

Val Thr Leu Ser Gly Gly Ser Gly Asn Ala Asp Leu Ser Leu Arg Ala
        420   425   430

Asn Ala Leu Pro Thr Asp Ala Ala Phe Gly Cys Arg Ser Met Leu Val
        435   440   445

Gly Asn Thr Glu Ala Cys Thr Leu Thr Ala Pro Ala Ala Gly Thr Tyr
    450   455   460

Tyr Val Arg Leu Lys Gly Thr Leu Ala Phe Ser Ala Val Asn Leu Val
465   470   475   480

Ala Thr Tyr

<210>   57
<211>   549
<212>   PRT
<213>   Xanthomonas campestris

<400>   57

Ser Asp Pro Leu Phe Arg Tyr Gln Trp His Leu Leu Asn Asp Gly Gln
1   5   10   15

Glu Val Ile Ala Asp Thr Arg Pro Arg Ala Gly Thr Asp Leu Asn Val
        20   25   30

Gly Pro Leu His Thr Leu Gly Leu Arg Gly Gln Gly Val Thr Val Ala
        35   40   45

Val Val Asp Asp Ala Leu Glu Leu Arg His Pro Asp Leu Val Ala Asn
    50   55   60

Val Val Pro Gly Gly Ser Lys Asn Phe Val Asp Gly Ser Asn Asp Pro
65   70   75   80

Thr Pro Arg Asn Gly Ala Ser His Gly Thr Met Val Gly Gly Ile Met
            85   90   95

Ala Ala Val Gly Trp Asn Gly Leu Gly Gly Arg Gly Val Ala Pro Asp
        100   105   110

Ala Arg Leu Lys Gly Phe Asn Ile Leu Ser Ser Glu Glu Ser Pro Thr

131

Asp Phe Asp Thr Asn Leu Arg Ala Ser Trp Gly Asp Ser Val Gln Ser
    130   135   140

Arg Asp Val Asp Val Phe Asn Asn Ser Phe Gly Ser Asp Leu Thr Tyr
145   150   155   160

Tyr Pro Thr Ile Ser Pro Ala Ala Glu Arg Ser Leu Asp Arg Leu Met
                165   170   175

Arg Arg Ala Arg Asn Gly Lys Gly Gly Leu Tyr Val Gln Ala Ala Gly
            180   185   190

Asn Thr Phe Asp Ser Phe Thr Val Leu Asp Asp Gln Gly Asn Trp Val
            195   200   205

Glu Arg Cys Pro Val Leu Ala Arg Thr Leu Gly Val Thr Cys Ser Thr
    210   215   220

Pro Ala Thr Asp Pro Leu Ser Asn Gln Pro Leu Ile Ile Ala Thr Gly
225   230   235   240

Ala Val Asn Ala Arg Gly Leu Arg Ser Ser Tyr Ser Ser Ala Gly Ala
            245   250   255

Ala Leu Trp Val Thr Gly Phe Gly Gly Glu Phe Gly Leu Gln Arg Arg
            260   265   270

Tyr Phe Gly Asp Arg Pro Arg Pro Ala Leu Phe Asp Pro Ala Ile Val
    275   280   285

Thr Thr Asp Leu Thr Gly Cys Ala Val Gly Asp Asn Arg Asp Ile Ala
    290   295   300

Gly Gln Pro Pro Ile Asn Ala Leu Ala Ser Ser Ser Ser Pro Ile Asp
305   310   315   320

Ala Ser Cys Asn Tyr Ser Ala Ala Met Asn Gly Thr Ser Ala Ala Ala
            325   330   335

Pro Thr Val Ala Gly Val Val Ala Leu Ile Val Gln Ala Asn Pro Ser
            340   345   350

Leu Thr Ala Arg Asp Leu Lys Tyr Ile Leu Ala Thr Ser Ala Arg Gln
    355   360   365

Ile Asp Pro Ala Gln Gln Val Ile Arg Tyr Gln Gly Ser Val Ile Glu
    370   375   380

Pro Gly Trp Ile Thr Asn Ala Ala Gly His Ala Phe Ser Asn Trp Tyr
385   390   395   400

Gly Phe Gly Leu Val Asp Ala Ala Glu Ala Val Tyr Arg Ala Tyr Gly
            405   410   415

Phe Gln Pro Leu Pro Pro Gln Arg Asp Leu Gly Trp Lys Ala Ala Arg

132

```
                420                     425                        430
     Ala Gly Thr Ser Thr Ile Gly Gly Pro Asn Ala Ala Ala Thr Leu Arg
             435                 440                 445

     Leu Arg Leu Gly Asp Thr Leu Lys Ile Asp Thr Val Gln Trp Ser Met
             450                 455                 460

     Gln Thr Thr His Lys Thr Pro Ser Asn Leu Arg Val Val Leu Ile Ser
     465                 470                 475                 480

     Pro Ser Gly Thr Arg Ser Tyr Val Leu Thr Pro Phe Gln Ala Leu Asp
                 485                 490                 495

     Thr Ile Thr Gln Gly Ala Gly Phe Glu Ile Pro Leu Ser Thr Ser Asn
                 500                 505                 510

     Ala Phe Leu Asp Glu Asn Val Ala Gly Thr Trp Thr Leu Glu Val Thr
             515                 520                 525

     Asp Met Thr Gly Ser Asp Val Pro Ala Gln Leu Thr Gly Phe Lys Leu
             530                 535                 540

     Arg Ile Leu Gly His
     545


     <210>      58
     <211>      348
     <212>      PRT
     <213>      Xanthomonas campestris

     <400>      58

     Ser Val Leu Arg Arg Gly Val Leu Gly Lys Val Leu Val Ala Val Gly
     1               5                   10                  15

     Ile Gly Asp Arg Leu Gly Arg Val Ala Asp Arg Gln Ala Ala Cys Ala
                 20                  25                  30

     Gly Leu Thr Ile His Ala Val Leu Gly Ala Gly His His Gly Glu Val
             35                  40                  45

     Ala Gly Leu Val His Gln Arg Ala Gly Leu Gly Val Gly Ala Gly Cys
             50                  55                  60

     Arg Arg Ala Pro Glu Arg Val Ala Asp Met Asp Leu Val Arg Leu Val
     65                  70                  75                  80

     Arg Ile Asp Val Ser Glu Gly Val Arg Gln Ile Arg Phe Ala Ala Ala
                 85                  90                  95

     Val Asp Arg Gln Leu Ala Ile Val Leu Val Gln Arg Val Val Asp Val
                 100                 105                 110

     Asp Glu Val Gly Ala Asp Pro Ala Val Ala Arg Gly Val Val Gly Ala
             115                 120                 125
```

133

```
Glu Pro Gly Gly Val Ala Arg Pro Gly Ala Ala Ala Val Glu Val Gly
    130             135             140

Thr Arg Val Leu Arg Val Ile Thr Arg Gly Ser Asp Ala Thr Gly Gly
145             150             155             160

Leu Val Gly Ala Gly Gly Ala Ala Val Glu Ile Val Asp Ala Val Asp
                165             170             175

His Gly Gly Arg Ala Asp Cys Glu Leu Ala Leu Tyr Thr Thr Ser Arg
                180             185             190

Ala Ile Gln Pro Asn Ser Glu Arg Gly Ala Gly Gly His Cys Arg Gln
            195             200             205

Ala Val Cys Gly Leu His Arg Ala Ala Ile Gly Gln Arg Gly Val Leu
    210             215             220

Gln Arg Arg Ala His Leu Asp Gly Val Val Ala Ala Gly Gly Gln Val
225             230             235             240

Ile Gly Ala Gly Gln Ile His Leu Ala Leu Asp Ala Leu Ala Arg Leu
                245             250             255

Gln Asp Gly Glu Val Gly Cys Leu Gly Gln Ala Ala Leu Asp Gln Ala
            260             265             270

Pro Gly Val Val His Arg Leu Ala Val Ala Ala His Leu Gln Asp Ala
            275             280             285

Val Val Gln Arg Leu Gln Arg Gln Leu Ile Gly Arg Asn Ala Gly Asn
    290             295             300

Leu Ala Thr Val Val Gly Asp Gly Asp Arg Asp Leu Ala Leu Met Ser
305             310             315             320

Pro Gly Leu Val Gly His Trp Arg Gln Phe Asp Gly Gln Arg Asn Arg
            325             330             335

Ser Ala His Gly Leu Cys Leu Arg Arg Thr Glu His
            340             345


<210>      59
<211>      595
<212>      PRT
<213>      Xanthomonas campestris

<400>      59

Val Val Val Ala His Ser Gln Gly Ser Met Ile Ala Tyr Asp Val Leu
1               5               10              15

Arg Gln Leu Gln Ala Asp Gly Cys Glu Val Ala Leu Phe Leu Thr Leu
            20              25              30
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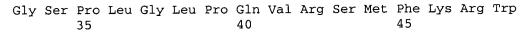
134

```
Gly Ser Pro Leu Gly Leu Pro Gln Val Arg Ser Met Phe Lys Arg Trp
    35            40                45

Thr Gly Thr Arg Lys Leu Pro Phe Pro Asp Cys Val Arg Arg Trp Val
    50            55              60

Asn Val Ala Glu Thr Arg Asp Pro Ile Ala Leu Asp Pro Asp Leu Thr
65              70              75                      80

Asp Asp Ile Ala Asn Ala Lys Gly Arg Phe Glu Asn Ile Ala Ala Ala
            85                  90                  95

Arg Leu Asn Pro Asp Trp Glu His Asn Pro His Ser Gly Ser Gly Tyr
        100             105             110

Leu Ala Ile Ala Gln Val Arg Ala Ala Val Arg Gln Ala Val Gly Val
    115             120             125

Gly Phe Asp Gln Pro Val Ser Asn Ala Val Leu Ile Lys Asp Leu Ser
    130             135             140

Glu Gln Leu Glu Ala His Gly Ala Asp Tyr Arg His Glu Val Leu Ile
145             150             155                     160

Glu Leu Asp Arg Arg Val Leu Gly Ala Asp Pro Ala Gly Val Arg Ala
            165             170             175

Gln Leu Ile Thr His Met Arg Gln Ile Ala Gly His Ser Thr Gly Leu
        180             185             190

Asp Gly Asp Ala Leu Asp Glu Ala Ile Glu Leu Glu Asp Ser Leu Gln
        195             200             205

Arg Leu Ile Ser Ala Arg Leu Thr Arg Phe Glu Ile Glu Thr Leu Gln
    210             215             220

Ser Arg Tyr Arg Ala Leu Gly Phe Arg Arg Val Trp Arg Asp Ala Gly
225             230             235                     240

Lys Arg Ala Leu Ile His Val Ser Gly Asn Val Leu His Val Asp Ala
            245             250             255

Ala Arg Thr Ala Tyr Arg Ala Arg Gly Gln Gln Ile Gly Trp Ala Val
            260             265             270

Leu Asp Thr Gly Ile Ala Ala Ala His Pro His Phe Phe Val Pro Gly
    275             280             285

Glu Arg Asp Asn Val Val Ala Gln Trp Asp Cys Thr Arg Arg Gly Ala
    290             295             300

Pro Lys Arg Leu Thr Arg Ala Asp Gly Lys Arg Phe Thr Ala Leu Asp
305             310             315                     320

Gly His Gly His Gly Thr His Ile Ala Gly Ile Ile Ala Gly Cys Cys
            325             330             335
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135

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Arg Ala Ala Val Pro Asp Ala Ser Gly Lys Pro Gly Glu Leu Leu Glu
          340               345               350

Phe Ala Gly Met Ala Pro Glu Thr Gln Leu Tyr Gly Phe Lys Val Leu
        355               360               365

Asp Asp Ala Gly Asn Gly Arg Asp Ser Trp Met Ile Lys Ala Val Gln
    370               375               380

His Val Ala Asp Leu Asn Glu Arg Ala Gly Glu Leu Val Ile His Gly
385               390               395               400

Val Asn Leu Ser Leu Gly Gly Tyr Phe Asp Pro Glu Ser Tyr Gly Cys
            405               410               415

Gly Phe Thr Pro Leu Cys Asn Glu Leu Arg Arg Leu Trp Arg Gln Gly
            420               425               430

Val Leu Val Val Val Ala Ala Gly Asn Glu Gly Leu Ala Trp Leu Met
        435               440               445

Gln Asn Asp Gly Gly Thr Tyr Pro Ala Asn Met Asp Leu Ser Ile Ser
    450               455               460

Asp Pro Gly Asn Leu Glu Asp Ala Ile Val Val Gly Ser Val His Lys
465               470               475               480

Ser Ser Pro His Asn Tyr Gly Val Ser Tyr Phe Ser Ser Arg Gly Pro
                485               490               495

Thr Ala Asp Gly Arg Ser Lys Pro Asp Val Val Ala Pro Gly Glu Lys
            500               505               510

Ile Leu Ser Ala Tyr Tyr Gly Phe Asp Pro Arg Asp Pro Ser Ser Leu
        515               520               525

Met Val Glu Met Ser Gly Thr Ser Met Ala Ala Pro His Val Ser Gly
    530               535               540

Val Leu Ala Gly Phe Leu Ser Ala Arg Arg Glu Phe Ile Gly Phe Pro
545               550               555               560

Asp Arg Val Lys Gln Leu Leu Leu Asp Thr Cys Thr Asp Leu Gln Arg
            565               570               575

Asp Arg Tyr Val Gln Gly Arg Gly Val Pro Asn Leu Met Arg Met Leu
        580               585               590

Gly Glu Thr
        595


<210>      60
<211>      627
<212>      PRT
<213>      Xanthomonas campestris
```

136

<400>   60

Val Ile Asp Lys Asn Phe Arg Leu Asn Pro Leu Thr Gly Ala Ile Leu
1   5   10   15

Met Met Ala Leu Gly Ala Ser Gly Thr Leu Val Ala Ala Pro Ala Leu
            20   25   30

Gln Val Lys Glu Pro Thr Gln Ala Ala Pro Ala Ala Ser Asp Phe Ser
        35   40   45

Ser Arg Leu Ile Val Arg Tyr Lys Asp Gly Thr Ala Ala Ala Ser Asp
        50   55   60

Arg Ser Ser Lys Leu Gly Val Val Gln Ser Ala Val Gly Arg Ala Ala
65   70   75   80

Pro Val Thr Gly Ala Arg Ala Gly Ala Thr Ala Ala Lys Ala Thr Tyr
            85   90   95

Leu Arg Lys Leu Gly Ile Gly Ser Asp Leu Ile Lys Leu Ser Gly Thr
        100   105   110

Leu Thr Ala Ala Gln Val Asp Lys Val Val Val Glu Leu Lys Asn Asp
        115   120   125

Pro Ser Val Ala Glu Val Gln Ile Asp Arg Met Leu Arg Pro Val Glu
        130   135   140

Ile Lys Lys Ser Val Ala Ala Thr Asp Val Ser Pro Gln Leu Val Pro
145   150   155   160

Asn Asp Pro Leu Tyr Ala Gln Tyr Gln Trp His Leu Ser Asn Pro Asn
            165   170   175

Gly Gly Ile Asn Ala Pro Ala Ala Trp Asp Leu Ser Gln Gly Ala Gly
        180   185   190

Val Val Val Ala Val Leu Asp Thr Gly Ile Leu Pro Gly His Pro Asp
        195   200   205

Phe Ala Gly Asn Leu Leu Gln Gly Tyr Asp Phe Ile Thr Asp Ala Glu
    210   215   220

Val Ser Arg Arg Pro Thr Asp Ala Arg Val Pro Gly Ala Leu Asp Tyr
225   230   235   240

Gly Asp Trp Glu Glu Ala Asp Asn Val Cys Tyr Asp Gly Ser Val Ala
            245   250   255

Gln Glu Ser Ser Trp His Gly Thr His Val Ser Gly Thr Val Ala Glu
        260   265   270

Ala Thr Asn Asn Gly Leu Gly Met Ala Gly Val Ala Pro Lys Ala Thr
        275   280   285

Ile Leu Pro Val Arg Val Leu Gly Arg Cys Gly Gly Tyr Thr Ser Asp

137

Ile Ala Asp Ala Ile Val Trp Ala Ser Gly Gly Thr Val Asp Gly Val
305   310   315   320

Pro Ala Asn Thr Asn Pro Ala Glu Val Ile Asn Met Ser Leu Gly Gly
                325   330   335

Gly Glu Pro Cys Asp Pro Ala Thr Gln Val Ala Ile Asn Gly Ala Val
            340   345   350

Ser Arg Gly Thr Thr Val Val Val Ala Ala Gly Asn Ser Gly Glu Asp
        355   360   365

Ala Ala Asn His Ser Pro Ala Ser Cys Asn Asn Thr Ile Thr Val Gly
    370   375   380

Ala Thr Arg Ile Thr Gly Gly Ile Thr Tyr Tyr Ser Asn Tyr Gly Ser
385   390   395   400

Lys Val Asp Leu Ser Gly Pro Gly Gly Gly Gly Ser Val Asp Gly Asn
            405   410   415

Pro Gly Gly Tyr Ile Trp Gln Ala Gly Tyr Asp Gly Ala Thr Thr Pro
            420   425   430

Thr Ser Gly Ser Tyr Ser Tyr Met Gly Met Gly Gly Thr Ser Met Ala
        435   440   445

Ser Pro His Val Ala Gly Val Val Ala Leu Val Gln Ser Ala Ser Ile
    450   455   460

Gly Leu Gly Asp Gly Pro Leu Thr Pro Ala Ala Met Glu Ala Leu Leu
465   470   475   480

Lys Gln Ala Ser Arg Arg Phe Pro Val Thr Pro Pro Thr Ser Thr Pro
            485   490   495

Ile Gly Ser Gly Ile Val Asp Ala Lys Ala Ala Leu Glu Ala Val Leu
            500   505   510

Val Glu Pro Cys Asp Pro Asp Thr Glu Thr Cys Ala Pro Ala Ala Ile
        515   520   525

Ala Leu Thr Asn Lys Ala Pro Leu Thr Gly Leu Ser Gly Glu Tyr Asn
    530   535   540

Ser Ser Thr Leu Tyr Ser Phe Glu Ala Lys Ala Gly Ala Val Leu Ser
545   550   555   560

Phe Met Thr Tyr Gly Gly Thr Gly Asn Val Ser Val Tyr Val Ser Phe
            565   570   575

Glu Ala Glu Pro Thr Ala Thr Asp Tyr Asp Ala Lys Ser Thr Arg Pro
            580   585   590

Gly Asn Ser Glu Thr Val Arg Phe Thr Ala Pro Lys Ala Gly Thr Tyr

138

```
            595                    600                      605

Tyr Ile Lys Leu Val Gly Ala Gly Asp Tyr Ala Lys Leu Thr Leu Val
    610             615                 620


Ala Arg Gln
625


<210>      61
<211>      959
<212>      PRT
<213>      Xanthomonas campestris

<400>      61


Met Leu Arg Pro Leu Ser Leu Leu Ile Ala Gly Val Leu Gly Val Ala
1               5               10                  15

Ala Gly Thr Val Ala Pro Ala Ala Gln Ala Ala Pro Ala Ser Leu Ser
            20              25                  30

Lys Thr Ala Asn Ser Ser Ala Ile Pro Asp Ile Ala Tyr Thr Arg Phe
        35              40                  45

Thr Leu Pro Asn Gly Leu Thr Val Val Val His Glu Asp His Lys Ala
    50              55                  60

Pro Val Val Ala Val Ser Ile Trp Tyr His Ile Gly Ser Gly Asp Glu
65              70              75                  80

Pro Ala Gly Lys Thr Gly Phe Ala His Leu Phe Glu His Leu Met Phe
            85              90                  95

Ser Gly Ser Glu Asn Asn Lys Gly Ser Phe Phe Ala Pro Leu Glu Lys
        100             105                 110

Val Gly Thr Thr Asp Met Asn Gly Thr Thr Trp Phe Asp Arg Thr Asn
        115             120                 125

Tyr Phe Glu Thr Val Pro Thr Thr Ala Leu Asp Thr Ala Leu Trp Leu
    130             135                 140

Glu Ser Asp Arg Met Gly His Leu Leu Gly Ala Ile Gly Gln Glu Glu
145             150                 155                 160

Leu Asp Thr Gln Arg Gly Val Val Gln Asn Glu Lys Arg Gln Gly Glu
            165             170                 175

Asn Arg Pro Tyr Gly Arg Val Asp Gln Asn Ile Leu Ser Asn Leu Phe
            180             185                 190

Pro Ala Asn His Pro Tyr Gln His Asp Thr Ile Gly Ser Met Glu Asp
        195             200                 205

Leu Asp Ala Ala Ser Leu Ala Asp Val Lys Gln Trp Phe Asn Asp Asn
    210             215                 220
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139

```
Tyr Gly Ala Ala Asn Thr Thr Leu Val Leu Ala Gly Asp Ile Thr Val
225             230             235             240

Ala Gln Ala Arg Ala Lys Ala Glu Gln Tyr Phe Gly Asp Ile Pro Ser
            245             250             255

Gly Lys Pro Val Ala Arg Gln Gln Pro Trp Val Thr Pro Leu Ala Ala
            260             265             270

Gln Lys Arg Gly Val Gln His Asp His Val Ser Gln Pro Arg Ile Tyr
            275             280             285

Arg Thr Trp Ala Ala Pro Gln Leu Gly Thr Asp Asp Met Ile Gln Leu
        290             295             300

Asp Leu Ala Thr Thr Val Leu Gly Gly Gly Lys Thr Ser Arg Leu Tyr
305             310             315             320

Gln Arg Leu Val Tyr Gln Asp Gln Leu Val Asp Asp Val Ser Ala Ser
            325             330             335

Ile Gln Pro Phe Ala Leu Ala Ser Gln Met Gln Ile Gln Ala Asp Val
            340             345             350

Lys Asp Gly Val Asp Pro Ala Lys Val Glu Ala Ile Ile Asp Glu Glu
        355             360             365

Leu Lys Lys Phe Leu Ala Glu Gly Pro Thr Ala Asp Glu Leu Gln Arg
        370             375             380

Ala Gln Val Ala Tyr Arg Ala Gly Phe Val Arg Gly Leu Glu Lys Val
385             390             395             400

Gly Gly Phe Gly Gly Lys Ala Val Ile Leu Ala Glu Gly Gln Val Tyr
            405             410             415

Arg Gly Asp Pro Gly Ala Tyr Lys Gln Asp Leu Gln Arg Gly Gln Ala
            420             425             430

Ala Thr Ile Gly Ser Val Lys Gln Ala Ala Ser Thr Trp Phe Gly Lys
        435             440             445

Gly Asp Tyr Leu Leu Thr Val Leu Pro Ala Gly Lys Asp Phe Asp Pro
        450             455             460

Ala Ala Glu Asp Lys Ala Val Val Ala Arg Gly Thr Glu Pro Gly Lys
465             470             475             480

Pro Ala Pro Lys Leu Pro Ala Ala Ala Lys Tyr Lys Val Thr Ala Ser
            485             490             495

Lys Leu Asp Arg Ser Lys Gly Val Pro Asp Thr Ala Ser Phe Pro Asp
            500             505             510

Leu Ser Phe Pro Gln Leu Gln Arg Gly Lys Leu Lys Asn Gly Val Glu
        515             520             525
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140

Val Ile Leu Ala Glu Arg His Thr Ile Pro Val Thr Gln Val Glu Leu
    530   535   540

Leu Phe Asp Ala Gly Tyr Ala Ala Asp Gln Gly Lys Lys Leu Gly Thr
545   550   555   560

Ala Ser Phe Ser Ala Ala Leu Met Asn Glu Ser Thr Ala Ser Leu Asp
                565   570   575

Ser Val Glu Val Ala Gln Arg Arg Gln Arg Leu Gly Ala Ile Thr Glu
                580   585   590

Val Gly Cys Asp Leu Asp Ser Cys Ser Ala Ser Leu Asn Ala Leu Asn
                595   600   605

Asp Gln Leu Gln Pro Ser Leu Gln Leu Phe Ser Asp Ile Val Arg Asn
    610   615   620

Pro Ala Phe Lys Ala Ala Asp Ile Glu Arg Ile Arg Gly Gln Trp Leu
625   630   635   640

Ala Gly Ile Ala Gln Glu Lys Thr Gln Pro Asn Ser Leu Gly Leu Arg
                645   650   655

Ala Leu Pro Pro Leu Met Tyr Gly Asp Lys His Pro Tyr Gly Ile Pro
                660   665   670

Leu Thr Gly Ser Gly Thr Glu Ala Ala Ile Lys Ser Leu Asn Ala Lys
    675   680   685

Asp Leu Gln Ala Phe His Asn Gln Trp Leu Arg Pro Asp Asn Leu Arg
    690   695   700

Ile Leu Val Ala Gly Asp Thr Thr Leu Ala Gln Ile Ile Pro Gln Leu
705   710   715   720

Asp Ala Ala Phe Gly Asp Trp Thr Ala Pro Ala Ala Pro Leu Pro Lys
                725   730   735

Lys Asn Leu Val Asn Val Ala Ala Gln Pro Lys Pro Arg Val Tyr Leu
                740   745   750

Ile Asn Arg Pro Asp Ala Pro Gln Ser Val Ile Leu Ala Gly Leu Leu
                755   760   765

Ala Pro Ser Thr Lys Ala Pro Asp Asn Leu Ala Ile Thr Val Ala Asn
    770   775   780

Gly Ala Phe Gly Gly Thr Phe Thr Ser Arg Leu Asn Met Asn Leu Arg
785   790   795   800

Glu Asn Lys Arg Trp Ala Tyr Gly Ala Arg Thr Gln Leu Val Asp Ala
                805   810   815

Gln Gly Gln Arg Pro Tyr Met Phe Ala Ala Pro Val Gln Thr Asp Lys
                820   825   830

141

Thr Ala Glu Ser Ala Asn Glu Ile Phe Lys Glu Ala Thr Ala Ile Ile
        835   840   845

Gly Asp Lys Pro Leu Thr Thr Glu Glu Ile Glu Lys Ile Lys Asn Gln
        850   855   860

Arg Ile Arg Ala Leu Pro Gly Ser Phe Glu Thr Thr Gly Ala Val Leu
865   870   875   880

Gly Ala Ile Glu Gly Ile Val Gln Phe Asp Arg Pro Asp Asn Tyr Val
                885   890   895

Gln Thr Leu Lys Pro Arg Leu Glu Ala Ile Asp Gln Pro Ala Ala Gln
            900   905   910

Ala Ala Ile Lys Asp Ile Ile Ala Pro Asn Ala Met Thr Trp Val Ile
        915   920   925

Val Gly Asp Leu Lys Lys Ile Glu Ala Pro Val Arg Ala Leu Lys Leu
        930   935   940

Gly Glu Val Gln Val Leu Asp Thr Asp Gly Lys Pro Val Lys Arg
945   950   955

<210>   62
<211>   428
<212>   PRT
<213>   Xanthomonas campestris

<400>   62

Met Ser Glu Asp Arg Gln Gly Arg Ser Gly Asp Ser Asn Lys Ile Leu
1   5   10   15

Tyr Cys Ser Phe Cys Gly Lys Ser Gln His Glu Val Arg Lys Leu Ile
        20   25   30

Ala Gly Pro Ser Val Phe Ile Cys Asp Glu Cys Val Glu Leu Cys Asn
        35   40   45

Asp Ile Ile Arg Glu Glu Leu Glu Glu Lys Ala Gln Ser Ala Arg Ser
        50   55   60

Ser Leu Pro Lys Pro Arg Glu Ile Leu Glu Val Leu Asp Gln Tyr Val
65   70   75   80

Ile Gly Gln Leu Arg Ala Lys Arg Thr Leu Ala Val Ala Val Tyr Asn
                85   90   95

His Tyr Lys Arg Ile Glu Ser Arg Ser Lys Asn Asp Glu Val Glu Leu
        100   105   110

Ala Lys Ser Asn Ile Leu Leu Val Gly Pro Thr Gly Ser Gly Lys Thr
        115   120   125

142

```
Leu Leu Ala Glu Thr Leu Ala Arg Leu Leu Asn Val Pro Phe Thr Ile
    130                 135                 140

Ala Asp Ala Thr Thr Leu Thr Glu Ala Gly Tyr Val Gly Glu Asp Val
145                 150                 155                 160

Glu Asn Ile Ile Gln Lys Leu Leu Gln Lys Cys Asp Tyr Asp Val Glu
                165                 170                 175

Lys Ala Gln Gln Gly Ile Val Tyr Ile Asp Glu Ile Asp Lys Ile Ser
                180                 185                 190

Arg Lys Ser Glu Asn Pro Ser Ile Thr Arg Asp Val Ser Gly Glu Gly
        195                 200                 205

Val Gln Gln Ala Leu Leu Lys Leu Ile Glu Gly Thr Val Ala Ser Val
    210                 215                 220

Pro Pro Gln Gly Gly Arg Lys His Pro Gln Gln Glu Phe Leu Gln Val
225                 230                 235                 240

Asp Thr Lys Asn Ile Leu Phe Ile Cys Gly Gly Ala Phe Ala Gly Leu
                245                 250                 255

Asp Lys Val Ile Gln Ala Arg Ser Asn Asp Ala Gly Gly Ile Gly Phe
            260                 265                 270

Gly Ala Lys Val Lys Ser Ser Glu Arg Lys Gln Glu Val Gly Lys Ile
        275                 280                 285

Leu Ala Glu Val Glu Pro Glu Asp Leu Ile Lys Phe Gly Leu Ile Pro
    290                 295                 300

Glu Phe Val Gly Arg Leu Pro Val Val Ala Thr Leu Glu Glu Leu Asp
305                 310                 315                 320

Glu Pro Ala Leu Ile Lys Ile Leu Thr Glu Pro Lys Asn Ala Ile Thr
            325                 330                 335

Lys Gln Phe Lys Lys Leu Phe Glu Met Glu Ser Val Glu Leu Glu Phe
            340                 345                 350

Arg Pro Asp Ala Leu Ser Ala Ile Ala Lys Lys Ala Leu Lys Arg Lys
        355                 360                 365

Thr Gly Ala Arg Gly Leu Arg Thr Ile Val Glu Ser Val Leu Leu Asp
    370                 375                 380

Thr Met Tyr Glu Leu Pro Ser Gln Glu Asn Val Ser Lys Val Val Val
385                 390                 395                 400

Asp Glu Ser Val Ile Glu His Lys Ser Glu Pro Tyr Leu Ile Tyr Gln
            405                 410                 415

Ala Gln Pro Ala Pro Ala Lys Ala Ala Ser Gly Asp
        420                 425
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143

<210>   63
<211>   205
<212>   PRT
<213>   Xanthomonas campestris

<400>   63

Val Thr Lys Ala Leu Asn Leu Val Pro Met Val Val Glu Gln Thr Ser
1   5   10   15

Arg Gly Glu Arg Ala Tyr Asp Ile Tyr Ser Arg Leu Leu Lys Glu Arg
            20   25   30

Leu Ile Phe Leu Val Gly Pro Ile Asp Asp His Met Ala Asn Val Ile
        35   40   45

Val Ala Gln Leu Leu Phe Leu Glu Ala Asp Asn Pro Glu Lys Asp Ile
        50   55   60

Ser Ile Tyr Ile Asn Ser Pro Gly Gly Val Val Thr Ala Gly Met Ala
65   70   75   80

Ile Tyr Asp Thr Met Gln Tyr Ile Lys Pro Asp Val Ser Thr Ile Cys
            85   90   95

Val Gly Gln Ala Ala Ser Met Gly Ala Leu Leu Leu Ala Ser Gly Ala
            100   105   110

Ala Gly Lys Arg Tyr Ala Leu Pro Asn Ser Arg Val Met Ile His Gln
            115   120   125

Pro Leu Gly Gly Phe Gln Gly Gln Ala Thr Asp Ile Asp Ile His Ala
        130   135   140

Arg Glu Ile Leu Thr Leu Arg Ser Arg Leu Asn Glu Ile Leu Ala Lys
145   150   155   160

His Thr Gly Gln Ser Leu Glu Thr Ile Ala Arg Asp Thr Glu Arg Asp
                165   170   175

Asn Phe Lys Ser Ala Val Asp Ala Gln Ala Tyr Gly Leu Val Asp Gln
            180   185   190

Val Leu Glu Arg Arg Pro Glu Glu Ser Ile Gln Pro Ser
        195   200   205

<210>   64
<211>   191
<212>   PRT
<213>   Xanthomonas campestris

<400>   64

Val Gln Ala Pro Leu Gln Ile Glu Glu Phe Leu Met Thr His Ser Leu
1   5   10   15

144

Ser Gly Lys Thr Val Ala Val Leu Ala Thr Ser Gly Phe Glu Gln Ser
         20   25   30

Glu Leu Gln Glu Pro Lys Arg Leu Leu Glu Ser Trp Gly Ala Thr Val
         35   40   45

Glu Val Ile Ala Pro Gly Asp Asp Ala Gln Ile Arg Gly Trp Asn His
    50   55   60

Thr Asp Trp Gly Asp Ser Val Pro Val Asp Thr Pro Leu Ala Gln Ala
65   70   75   80

Lys Pro Asp Arg Tyr Asp Ala Leu Val Leu Pro Gly Gly Val Ile Asn
         85   90   95

Pro Asp Asn Leu Arg Thr Asn Ala Gln Ala Ile Asp Phe Ile Arg Ser
         100   105   110

Val Ala Ala Ser Gly Lys Pro Val Ala Ala Ile Cys His Gly Pro Trp
         115   120   125

Leu Leu Val Glu Ser Gly Leu Val Arg Asp Arg Lys Val Thr Ser Trp
         130   135   140

Pro Ser Val Lys Thr Asp Leu Ser Asn Ala Gly Gly Arg Trp Glu Asp
145   150   155   160

Ala Glu Val Val Val Asp Gly Gln Leu Ile Thr Ser Arg Lys Pro Asp
         165   170   175

Asp Ile Pro Ala Phe Thr Asp Ala Val Ala Lys Ala Leu Ala Ala
         180   185   190

<210>   65
<211>   658
<212>   PRT
<213>   Xanthomonas campestris

<400>   65

Met Phe Ser Lys Asp Leu Glu Gln Thr Ile Gly Gln Cys Tyr Lys Arg
1   5   10   15

Ala Arg Glu Ala Arg His Glu Phe Met Thr Val Glu His Leu Leu Leu
         20   25   30

Ser Leu Leu Asp Asn Pro Ser Ala Gln Ala Val Leu Lys Ala Cys Gly
         35   40   45

Ala Asp Gln Val Arg Leu His Thr Asp Leu Glu Gln Ala Ile Glu Ala
         50   55   60

Ser Val Ser Arg Leu Ala Glu Asp Asp Gly Arg Asp Thr Gln Pro Thr
65   70   75   80

```
Leu Gly Phe Gln Arg Val Leu Gln Arg Ala Val Tyr His Val Gln Ser
             85                  90                  95

Ser Gly Lys Lys Glu Val Thr Gly Ala Asn Val Leu Val Ala Ile Phe
            100                 105                 110

Gly Glu Lys Asp Ser His Ala Val Tyr Phe Leu Asn Gln Gln Asp Ile
        115                 120                 125

Thr Arg Leu Asp Ile Val Asn Tyr Leu Ser His Gly Ile Ala Lys Leu
    130                 135                 140

Gly Glu Asp Gly Glu Gln Pro Ser Ala Ser Asp Gly Glu Pro Lys Ser
145                 150                 155                 160

Asp Ala Gly Glu Gly Glu Gly Lys Gly Asp Ala Leu Ala Glu Tyr Ala
            165                 170                 175

Thr Asn Leu Asn Asp His Ala Arg Asn Gly Lys Ile Asp Pro Leu Val
            180                 185                 190

Gly Arg Ala Asp Glu Ile Glu Arg Thr Ile Gln Val Leu Cys Arg Arg
        195                 200                 205

Arg Lys Asn Asn Pro Leu Tyr Val Gly Glu Ala Gly Val Gly Lys Thr
    210                 215                 220

Ala Ile Ala Glu Gly Leu Ala Lys Arg Ile Val Asp Ala Asp Val Pro
225                 230                 235                 240

Glu Val Leu Ala Asp Ala Val Ile Phe Ser Leu Asp Leu Gly Ala Leu
            245                 250                 255

Val Ala Gly Thr Lys Tyr Arg Gly Asp Phe Glu Lys Arg Leu Lys Gly
            260                 265                 270

Val Leu Thr Ala Leu Lys Lys Val Pro Asn Ala Val Leu Phe Ile Asp
    275                 280                 285

Glu Ile His Thr Ile Ile Gly Ala Gly Ser Ala Ser Gly Gly Thr Met
    290                 295                 300

Asp Ala Ser Asn Leu Ile Lys Pro Ala Leu Ala Ser Gly Glu Leu Arg
305                 310                 315                 320

Cys Ile Gly Ser Thr Thr Phe Gln Glu Tyr Arg Gly Ile Phe Glu Lys
            325                 330                 335

Asp Arg Ala Leu Ala Arg Arg Phe Gln Lys Ile Asp Ile Val Glu Pro
        340                 345                 350

Thr Val Gly Glu Thr Phe Glu Ile Leu Gln Gly Leu Lys Pro Lys Tyr
        355                 360                 365

Glu Ala His His Gly Val Thr Tyr Ala Asp Asp Ala Leu Gln Ala Ala
    370                 375                 380
```

146

```
Val Asp Leu Ser Val Lys His Ile Gly Asp Arg Leu Leu Pro Asp Lys
385                 390             395                 400

Ala Ile Asp Val Ile Asp Glu Ala Gly Ala Arg Gln Arg Leu Leu Pro
                405             410                 415

Glu Gly Gln Arg Lys Glu Leu Ile Asp Ile Glu Glu Ile Glu Thr Ile
            420             425             430

Val Ala Gln Asp Gly Ala Tyr Ser Gly Gln Ala Gly Gln Arg Asp Arg
            435             440             445

Gln Gly Arg Ala Ala Ala Ser Gly Thr Gln Ser Gln Asp Gly Asp Leu
            450             455             460

Arg Ala Glu Pro Gly Asp Arg Asn Ala Gly Trp Leu Asp Gln Ala Gly
465             470             475                 480

Ala Leu Gly Pro Gly Gln Ser Gly Glu Ala Asp Arg Gln Leu Pro Val
            485             490             495

Arg Trp Pro Asp Arg Cys Gly Gln Asp Arg Gly His Gln Ala Ala Arg
            500             505             510

Ala Ala Ile Gly His Arg Ala Gly Ala Val Arg His Val Arg Val His
            515             520             525

Gly Ser Ala Phe Asp Gln Pro Ser Asp Arg Cys Ala Ser Gly Leu Cys
            530             535             540

Arg Phe Arg Ser Gly Arg Ser Ala Asp Arg Lys Asp Arg Gln Asp Ala
545             550             555                 560

Ala Leu Arg Ala Ala Ala Gly Arg Gly Gly Glu Gly Ala Ser Gly His
            565             570             575

Leu Gln His Pro Val Ala Gly His Gly Pro Arg His Pro His Arg Tyr
            580             585             590

Gln Arg Ala Arg Ser Glu Leu Gln Glu Arg Asp Pro Gly Asp Asp Asp
            595             600             605

Gln Arg Arg Cys His Ala Gly Leu Ala Ser Phe Asp Arg Phe His Gln
            610             615             620

Ala Gly Ser Phe His Arg Cys Asp Gly Ile Asp Pro Pro Arg Phe His
625             630             635                 640

Ala Gly Val Pro Gln Pro Ser Gly Cys Asp Arg Ala Val Pro Ala Ala
            645             650             655

Gly Leu


<210>        66
<211>        325
<212>        PRT
```

147

<213>   Xanthomonas campestris

<400>   66

Met Ala Arg Ile Pro Ala Lys Gln Val Ser Ala Thr Asp Lys Asp Val
1   5   10   15

Leu Gln His Leu Glu Arg Asn Leu Lys Met Val Ile Phe Gly Gln Asn
            20   25   30

Pro Ala Ile Glu Thr Leu Ala Gly Ser Ile Lys Leu Ala Arg Ser Gly
        35   40   45

Leu Ala Asn Pro Glu Lys Pro Ile Gly Asn Phe Leu Phe Ala Gly Pro
    50   55   60

Thr Gly Val Gly Lys Thr Glu Val Thr Lys Gln Leu Ala Leu Gln Leu
65   70   75   80

Gly Ile Glu Leu Val Arg Phe Asp Met Ser Glu Tyr Met Glu Ala His
            85   90   95

Ser Ile Ser Arg Leu Ile Gly Ala Pro Pro Gly Tyr Val Gly Phe Asp
            100   105   110

Gln Gly Gly Leu Leu Thr Glu Lys Ile Val Lys Thr Pro His Cys Val
        115   120   125

Leu Leu Leu Asp Glu Val Glu Lys Ala His Pro Asp Ile Phe Asn Ile
    130   135   140

Leu Leu Gln Val Met Asp Arg Gly Ile Leu Thr Asp Thr Asn Gly Arg
145   150   155   160

Glu Ala Asn Phe Lys Asn Val Ile Leu Val Met Thr Thr Asn Ala Gly
            165   170   175

Ala Thr Gln Ala Ser Arg Arg Ser Ile Gly Phe Thr Lys Gln Asp His
        180   185   190

Ser Thr Asp Ala Met Glu Ser Ile Arg Arg Gly Phe Thr Pro Glu Phe
        195   200   205

Arg Asn Arg Leu Asp Ala Ile Val Gln Phe Gln Pro Leu Gly Phe Asp
    210   215   220

His Ile Leu Arg Val Val Asp Lys Phe Ile Ile Glu Leu Glu Met Leu
225   230   235   240

Leu Gln Glu Lys His Val Ser Leu Ser Ala Thr Pro Thr Ala Arg Asp
            245   250   255

Trp Leu Ala Gln His Gly Phe Asp Pro Leu Met Gly Ala Arg Pro Met
        260   265   270

Ser Arg Val Ile Gln Glu Lys Ile Lys Arg Pro Leu Ala Asp Glu Leu
    275   280   285

148

Leu Phe Gly Lys Leu Val Glu Gly Gly Arg Val Asn Ile Asp Val Lys
    290   295   300

Asp Gly Glu Leu Val Val Glu Ala His Pro Glu Pro Glu Arg Leu Leu
305   310   315   320

Pro Ala Thr Val Asp
                325

<210>   67
<211>   450
<212>   PRT
<213>   Xanthomonas campestris

<400>   67

Val Pro Leu Asp Glu Ile Arg Arg Phe Val Ala Val Tyr Asn Ala Val
1   5   10   15

Lys Gln Ala Tyr Val Asp Pro Val Glu Asp Lys Lys Leu Met His Ala
            20   25   30

Ala Val Arg Gly Leu Leu Ser Asp Leu Asp Pro His Ser Thr Tyr Phe
            35   40   45

Asp Lys Glu Asp Ala Glu Ala Phe Asp Glu Gln Ala Thr Gly Ala Tyr
    50   55   60

Asp Gly Ile Gly Val Glu Leu Leu Gln Gln Gln Asp Asn Thr Leu Lys
65   70   75   80

Val Ile Ala Pro Ile Asp Asp Thr Pro Ala Ala Arg Ala Gly Val Lys
                85   90   95

Ala Gly Asp Val Ile Val Ala Ile Asp Gly Lys Pro Ile Asp Ala Ser
            100   105   110

Lys Ala Met Glu Pro Leu Arg Gly Glu Ser Gly Ser Lys Val Thr Leu
            115   120   125

Thr Ile Val Arg Asp Lys Val Ala Lys Pro Phe Asp Ile Thr Leu Gln
    130   135   140

Arg Glu Thr Ile Arg Val Ala Ser Val Arg Ser Lys Leu Leu Glu Pro
145   150   155   160

Gly Tyr Gly Tyr Ile Arg Ile Ser Thr Phe Gln Ala Asp Thr Gly Ala
            165   170   175

Asp Phe Gln Lys Asn Leu Lys Gln Leu Gln Ala Gly Gly Lys Leu Arg
            180   185   190

Gly Leu Val Leu Asp Leu Arg Ser Asn Pro Gly Gly Leu Leu Thr Ser
            195   200   205

149

Ala Val Gln Val Ala Asp Asp Leu Leu Asp Lys Gly Asn Ile Val Ser
    210   215   220

Thr Arg Gly Arg Ile Ser Ile Ser Asp Ala Lys Phe Asp Ala Thr Pro
225   230   235   240

Gly Asp Leu Leu Gly Gly Ala Pro Val Val Val Leu Val Asp Ala Gly
            245   250   255

Ser Ala Ser Ala Ser Glu Val Leu Ala Gly Ala Leu Arg Asp Asn Gln
            260   265   270

Arg Ala Arg Ile Ile Gly Ser Arg Thr Phe Gly Lys Gly Ser Val Gln
            275   280   285

Thr Val Leu Pro Leu Asp Asn Gly Asp Ser Val Lys Leu Thr Thr Ala
    290   295   300

Arg Tyr Tyr Thr Pro Ser Gly Lys Ser Ile Gln Ala Ser Gly Ile Val
305   310   315   320

Pro Glu Val Met Leu Thr Pro Glu Pro Gln Pro Gly Asp Ala Asp Val
            325   330   335

Pro Ala Ser Leu Thr Asp Phe Ser Glu Ala Thr Leu Pro Gly His Leu
            340   345   350

Arg Gly Asp Ala Glu Gly Glu Glu Gly Tyr Ser Ala Gly Asp Val Leu
            355   360   365

Pro Gly Asp Gly Pro Ile Asn Glu Ala Leu Ala Glu Leu Lys Gln Pro
    370   375   380

Gly Ser Val Ala Lys Ala Gln Ala Ala Arg Lys Ala Lys Ala Gln Ala
385   390   395   400

Gln Lys Pro Lys Ala Ile Lys Pro Thr Pro Glu Pro Lys Pro Ala Ala
            405   410   415

Pro Arg Pro Pro Ala Ser Glu Gln Thr Thr Pro Ala Glu Pro Thr Asp
            420   425   430

Lys Ala Lys Pro Ala Ala Pro Val Pro Ala Ala Val Pro Ala Glu Pro
    435   440   445

Val Lys
    450

<210>   68
<211>   727
<212>   PRT
<213>   Xanthomonas campestris

<400>   68

Met Thr Tyr Asn Val Ser Ala Ser Leu Lys Ala Gly Leu Leu Ala Leu

150

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Val Leu Thr Thr Pro Met Ala Leu Leu Ala Arg Ala Asp Thr Ala Leu
            20              25              30

Pro Ala Ala Ala Thr Pro Glu Gln Ala Thr Ala Thr Lys Leu Val Tyr
            35              40              45

Gly Leu Leu Ser Asp Ser Arg Tyr Ala Tyr Arg Pro Arg Thr Leu Asp
    50              55              60

Glu Ala Met Ser Lys Asp Val Phe Lys Arg Tyr Leu Glu Thr Leu Asp
65              70              75              80

Gly Gly Lys Gln Phe Phe Thr Gln Ala Asp Val Asp Ala Phe Ala Pro
            85              90              95

Leu Gln Ala Gly Val Gly Asp Ala Leu Arg Gly Gly Asn Leu Glu Pro
            100             105             110

Ala Phe Gln Val Phe Ser Val Tyr Lys Lys Arg Val Asp Gln Arg Val
            115             120             125

Lys Tyr Ala Arg Glu Leu Leu Lys Gln Asp Phe Asp Phe Thr Gly Ser
    130             135             140

Glu Lys Phe Glu Tyr Asp Arg Lys Asp Val Pro Trp Ala Ala Asp Asp
145             150             155             160

Lys Gln Leu Asp Val Leu Trp Arg Gln Ser Val Met Asn Asp Trp Leu
            165             170             175

Arg Leu Lys Leu Ala Gly Lys Lys Ser Asp Asp Ile Arg Lys Thr Leu
            180             185             190

Asp Lys Arg Tyr Ala Thr Leu Ala Asp Ser Val Asn Glu Leu Lys Ala
    195             200             205

Glu Asp Ala Phe Gln Phe Phe Leu Asn Ala Tyr Thr Asn Ala Val Asp
    210             215             220

Pro His Thr Asp Tyr Phe Thr Pro Arg Thr Ala Glu Asn Phe Asn Gln
225             230             235             240

Gln Met Ser Leu Ser Leu Glu Gly Ile Gly Ala Gln Leu Gln Lys Gln
            245             250             255

Asp Asp Met Val Val Ile Arg Glu Val Ile Pro Gly Gly Pro Ala Ala
            260             265             270

Val Asp Gly Thr Leu Lys Pro Gly Asp Arg Ile Val Gly Val Gly Gln
    275             280             285

Thr Lys Ser Gly Ala Ile Glu Asp Val Ile Gly Trp Arg Ile Asp Asp
    290             295             300

Val Val Ala Lys Ile Arg Gly Ser Lys Asp Thr Gln Val Arg Leu Glu
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Tyr Ile Pro Ala Glu Leu Gly Ile Asp Gly Thr His Arg Thr Val Thr
            325   330   335

Leu Thr Arg Gln Lys Val Arg Leu Ala Glu Gln Ala Ala Lys Gly Glu
            340   345   350

Thr Ile Thr Leu Pro Ala Ser Gly Asp Val Pro Gln Arg Arg Ile Gly
            355   360   365

Ile Ile Lys Leu Pro Gly Phe Tyr Gln Asp Phe Glu Gly Arg Arg Arg
    370   375   380

Asn Ala Ala Asp Tyr Ala Ser Ala Thr Arg Asp Val Ala Lys Leu Leu
385   390   395   400

Ala Gly Phe Lys Ser Asp Lys Val Asp Gly Val Val Leu Asp Leu Arg
            405   410   415

Asn Asn Gly Gly Gly Ser Leu Asp Glu Ala Ile Glu Leu Thr Gly Leu
            420   425   430

Phe Ile Glu Gln Gly Pro Val Val Gln Val Arg Glu Ser Gly Gly Arg
            435   440   445

Val Thr Val Asn Gly Asp Ser Asn Pro Lys Val Ala Trp Asp Gly Pro
    450   455   460

Leu Gly Val Leu Ile Asn Arg Gly Ser Ala Ser Ala Ser Glu Ile Phe
465   470   475   480

Ala Gly Ala Ile Gln Asp Tyr Gly Arg Gly Leu Val Ile Gly Glu Thr
            485   490   495

Thr Phe Gly Lys Gly Thr Val Gln Asn Ile Val Asp Leu Asp Arg Trp
            500   505   510

Pro Ala Ala Glu Gly Gln Arg Tyr Gly Gln Val Lys Leu Thr Ile Ala
            515   520   525

Gln Phe Phe Arg Val Ser Gly Ser Ser Thr Gln His Lys Gly Val Val
            530   535   540

Pro Asp Ile Ala Phe Pro Ala Ser Val Asp Ala Thr Glu Phe Gly Glu
545   550   555   560

Ser Thr Tyr Asp Asn Ala Leu Pro Trp Thr Arg Ile Ala Ala Val Pro
            565   570   575

His Thr Gln Tyr Gly Asn Phe Ala Pro Leu Leu Pro Lys Leu Gln Thr
            580   585   590

Leu His Ala Thr Arg Ile Ala Ser Asp Lys Glu Phe Gln Trp Trp Glu
            595   600   605

Glu Asp Val Lys Gln Phe Arg Asp Glu Lys Ala Lys Lys Tyr Ile Ser

Leu Asn Glu Ala Glu Arg Val Ala Glu Arg Gln Lys Gln Asp Gln Gln
625   630   635   640

Arg Lys Asp Arg Gln Gln Val Arg Lys Gln Leu Gly Leu Pro Leu Asp
                645   650   655

Pro Leu Ala Asp Asp Ser Asp Asp Gly Leu Thr Gly Asn Glu Arg Asp
            660   665   670

Ile Val Lys Asp Thr Ala Arg Glu Lys Ala Ala Glu Lys Arg Pro Asp
            675   680   685

Pro Leu Leu His Glu Ser Ala Ala Ile Leu Ala Asp Ala Leu Gly Leu
        690   695   700

Leu Ser Lys Asp Gln Pro Leu Ser Ala Gln Val Leu Pro Gln Ser Thr
705   710   715   720

Ala Pro Gly Arg Trp Ala Asp
                725

<210>   69
<211>   803
<212>   PRT
<213>   Xanthomonas campestris

<400>   69

Val Ile Val Leu Leu Gly Leu Val Leu Leu Ala Gly Gly Ala Trp Leu
1   5   10   15

Ala Thr Leu Gly Gly Ser Trp Tyr Tyr Ala Pro Ala Gly Leu Ala Met
            20   25   30

Leu Ile Ala Gly Val Leu Leu Phe Arg Gly Arg Asn Ala Gly Ala Trp
        35   40   45

Trp Phe Ala Ala Val Val Ala Ala Thr Leu Leu Trp Thr Trp Trp Glu
    50   55   60

Ser Gly Ser Asp Tyr Trp Arg Trp Val Pro Arg Leu Gly Leu Ile Val
65   70   75   80

Gly Leu Ala Phe Val Leu Ala Leu Leu Leu Pro Lys Leu Glu Arg Pro
            85   90   95

Val Ser Arg Ala Val Ser Arg Ser Val Ala Gly Gly Leu Ala Val Val
            100   105   110

Phe Val Val Ala Phe Ala Leu Ala Phe Val Pro Phe Gly Ile Thr Glu
        115   120   125

Ala Glu Gly Ala Leu Thr Gln Val Ala Gly Ile Ala Ala Gly Val Val
    130   135   140

153

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Asn Arg Pro Ala Asp Gly Ala Gln Pro Ala Gln Pro Ala Asn Ala Pro
145             150             155             160

Val Asp Asp Asp Trp Ala Ala Tyr Gly Arg Ser Gln Ala Gly Gln Arg
            165             170             175

Tyr Ser Pro Leu Thr Gln Ile Asn Arg Asp Asn Val Ser Gln Leu Gln
            180             185             190

Gln Ala Trp Val Phe His Thr Gly Asp Val Pro Thr Lys Arg Trp Gly
            195             200             205

Ala Glu Thr Thr Pro Leu Lys Val Gly Asp Ser Leu Tyr Leu Cys Ser
        210             215             220

Ala Arg Asn Gln Val Ile Ala Leu Asp Ala Ser Thr Gly Lys Gln Arg
225             230             235             240

Trp Arg Tyr Asp Pro Lys Val Lys Asp Glu Ala Ile Pro Tyr Thr Ala
            245             250             255

Ala Cys Arg Gly Val Ser Tyr Tyr Glu Val Pro Thr Ala Ala Pro Ala
            260             265             270

Ala Asn Asp Ala Ala Ala Ser Gln Ala Ala Thr Ala Pro Ala Leu Cys
        275             280             285

Arg Thr Arg Val Ile Glu Gly Thr Leu Asp Gly Arg Leu Ile Ala Leu
        290             295             300

Asp Ala Arg Thr Gly Thr Pro Cys Ala Asp Phe Gly Thr His Gly Gln
305             310             315             320

Val Asp Ile Thr Val Gly Met Gly Glu Thr Pro Pro Gly Tyr Ile Ser
            325             330             335

Ile Asn Ser Pro Pro Ala Ile Val Arg Gly Val Val Val Ile Gly His
        340             345             350

Gln Val Leu Asp Gly Gln Lys Arg Tyr Glu Pro Ser Gly Val Ile Gln
        355             360             365

Gly Phe Asp Ala Val Thr Gly Gln Leu Arg Trp Ala Trp Asp Met Thr
        370             375             380

His Pro Glu Trp Asn Gly Ala Pro Pro Gly Gln Thr Trp Thr Arg
385             390             395             400

Gly Thr Pro Asn Met Trp Thr Thr Ala Ala Ala Asp Glu Gln Leu Gly
            405             410             415

Tyr Val Tyr Leu Pro Met Gly Asn Ser Thr Ala Asp Tyr Trp Ser Ser
            420             425             430

Ser Arg Thr Pro Pro Glu Asn Arg Tyr Ala Thr Ser Leu Val Ala Leu
        435             440             445
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154

Asp Val Thr Thr Gly Lys Pro Val Trp Asn Phe Gln Thr Thr His Ile
    450   455   460

Asp Ala Trp Asp Tyr Asp Leu Gly Ser Gln Pro Ser Leu Ile Asp Phe
465   470   475   480

Pro Lys Asp Gly Val Asn Val Pro Ala Val Leu Leu Pro Ser Lys Gln
            485   490   495

Gly Glu Leu Tyr Val Leu Asp Arg Arg Thr Gly Glu Pro Leu Val Gly
            500   505   510

Val Glu Glu Arg Ala Val Pro Gly Gly Gly Val Glu Pro Gln Met Arg
            515   520   525

Tyr Lys Thr Gln Pro Phe Ser Leu Tyr His Thr Leu Arg Lys Pro Asp
    530   535   540

Leu Thr Glu Arg Asp Met Trp Gly Met Thr Pro Ile Asp Gln Leu Val
545   550   555   560

Cys Arg Ile Gln Phe Arg Lys Ala Ser Tyr Lys Gly Ile Tyr Thr Pro
            565   570   575

Pro Glu Ala Asp Arg His Ser Ile Glu Tyr Pro Gly Tyr Asn Gly Gly
            580   585   590

Ser Asp Trp Gly Ser Val Ala Val Asp Pro His Arg Gly Val Ile Val
            595   600   605

Ala Asn Tyr Asn Asp Met Pro Asn Tyr Asn Ile Leu Val Pro Arg Ala
    610   615   620

Lys Ala Asp Lys Leu Gly Trp Ala Pro Arg Asp Gln Val Arg Gly Asp
625   630   635   640

Ala Gly Gly Ala Glu Gly Ala Gly Asp Pro Gln Ala Gly Thr Pro Tyr
            645   650   655

Ala Val Asn Val Asn Ala Gly Trp Arg Leu Pro Phe Thr Lys Leu Leu
            660   665   670

Cys Lys Gln Pro Pro Tyr Gly Gly Ile Arg Ala Ile Asp Leu Lys Ser
            675   680   685

Gly Lys Thr Leu Trp Asp Arg Pro Phe Gly Ser Ala Arg Gly Asn Gly
            690   695   700

Pro Phe Gly Ile Arg Ser Gly Leu Pro Ile Glu Ile Gly Thr Pro Asn
705   710   715   720

Asn Gly Gly Ser Val Val Thr Ala Gly Gly Leu Ile Phe Ile Ala Ala
            725   730   735

Ala Thr Asp Asp Leu Ile Arg Ala Ile Asp Leu Ala Thr Gly Lys Glu
            740   745   750

155

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Leu Trp His Ala Lys Leu Pro Ala Gly Gly Gln Ala Asn Pro Met Val
    755                 760                 765

Tyr Ala Tyr Gly Gly Arg Glu Tyr Leu Val Ile Met Ala Ala Gly His
    770                 775                 780

His Phe Met Glu Thr Pro Ala Gly Asp Ala Leu Val Ala Tyr Ala Leu
785                 790                 795                 800

Pro Gln Arg
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